SCIENCE

FRIDAY, SEPTEMBER 17, 1909

CONTENTS

MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

PROFESSOR SIMON NEWCOMB AS AN ASTRONOMER

PROFESSOR NEWCOMB has narrated at considerable length the personal incidents of his scientific career in his book "The Reminiscences of an Astronomer," and to that source the reader desirous of knowing them may be referred. Here it is intended to note only the scope and characteristics of his more important contributions to astronomy. While Professor Newcomb wished always to be accounted a mathematician, his work seems motived by its possible application to astronomy, and no very weighty contribution from his pen has accrued to pure mathematics.

While still an assistant in the office of the American Ephemeris, then at Cambridge, Mass., Professor Newcomb began his career as an astronomer by discussing the question of the origin of the minor planets. Induced by a too great confidence in the law of Bode as to the relations of the mean distances of the major planets, Olbers had ventured to put forward the hypothesis that the minor planets were the fragments resulting from the disruption of a single major planet. This hypothesis necessitated the condition that the orbits of the minor planets at some past epoch must have had a point in common. By computing the secular variations of the elements of the minor planets, Professor Newcomb showed that at no time could this condition have been fulfilled. Thus there was no reason for entertaining the theory of Olbers.

After Professor Newcomb's appointment to a professorship of mathematics in the U. S. Navy and his removal to Washington, he was much engaged with the instruments

of the U. S. Naval Observatory, chiefly the Pistor and Martin's transit circle, but found time to investigate the distance of the sun, concluded from all the methods. His result for the constant of solar parallax was 8″.848, a value adopted in nearly all the ephemerides for quite a lengthy period. It is too large chiefly on account of the large weight attributed to the determination from Mars, whose observation is subject to systematic errors, at that time unsuspected.

About the same time Professor Newcomb undertook the investigation of the orbit of Neptune and constructed general tables of its motion. As material he had the two observations of Lalande and those of eighteen years following the discovery of the planet. This investigation, published in the *Smithsonian Contributions to Knowledge,* met an urgent need of practical astronomy at that time.

As the secure reduction of astronomical observations is a matter of prime importance, Professor Newcomb contributed to the *Washington Observations* for 1870 an appendix dealing with the right ascensions of the equatorial fundamental stars. His aim was to eliminate as far as possible systematic errors of a personal or local nature and thus obtain a homogeneous system. This is an admirably conducted investigation and has served as a foundation for whatever has been since accomplished in this subject.

The elegant method of treating the motion of the moon by Delaunay, published in 1860, led Professor Newcomb to consider this subject; thus we have his memoir in Liouville's *Journal* for 1871 on the planetary perturbations of the moon. The investigation is very neat, regard being had to the early epoch of its composition, but the final equations derived are precisely those which result from Delaunay's method.

Having treated Neptune Professor Newcomb next undertook a similar piece of work for the adjacent planet Uranus. This was a heavier task than its predecessor on account of the longer period covered by the observations. These theories of the two planets have been superseded by the investigations of Professor Newcomb while director of the *American Ephemeris,* but that of Uranus was welcomed by astronomers as a great improvement on the discussion of Bouvard. As in the case of Neptune, the investigation of Uranus appears in the *Smithsonian Contributions to Knowledge.*

In the same collection for the following year Professor Newcomb has a memoir on the general integrals of planetary motion. The aim of this paper is to show how to avoid powers of the time as multipliers of the different portions of the algebraic expressions arrived at. The thus modified expressions have since received the name of Lindstedt's series and are the chief subject of investigation in M. Poincaré's work in the line of celestial mechanics. This paper is a worthy beginning for what was to follow.

Only a few years after the introduction of Hansen's lunar tables for computing the places for the ephemerides it was seen that observation was marching away from them. From the character of the deviation they could only be attributed to an imperfect determination by Hansen of the secular and long-period terms. Always interested in the theory of the moon, Professor Newcomb undertook to see what light could be thrown on the matter by observations made before the epoch 1750, chiefly in the form of times of beginning or ending of solar and lunar eclipses and occultations. This involved a heavy load of numerical computation and a careful research for material in the libraries and observatories of Europe. The results of this labor appear

in an appendix to the *Washington Observations* for 1875. The memoir led to large modifications in our estimation of the value of Hansen's theory and it still must serve as a foundation to all future investigations in the subject.

In 1877 Professor J. H. C. Coffin was retired from the U. S. Navy on account of age and thus the *American Ephemeris* was left without a head. Professor Newcomb was appointed to the vacant place. He immediately formed the grandiose scheme of reforming nearly all the fundamental data involved in the construction of an astronomical ephemeris. One would have been inclined to predict the failure or, at least, only partial success of such a scheme; but Professor Newcomb, by his skilful management, came very near to complete success during his lifetime; only tables of the moon were lacking to the rounding of the plan. It must, however, be noted that he was fortunate in finding a few men ready to hand in relieving him not only of the drudgery of numerical calculation, but, in some cases, of devising methods. To aid matters he founded a collection called *The Astronomical Papers of the American Ephemeris* to contain all the memoirs the carrying out the scheme should give occasion to. A large proportion of these memoirs is the work of Professor Newcomb. So numerous are they that we must be content with noticing only the more striking and important ones.

The transits of Mercury from 1677 to 1881 were discussed, with the principal result of corroborating Leverrier's assertion of 40″ in the secular motion of the perihelion unaccounted for.

In the years 1880–1882 Professor Newcomb made a determination of the velocity of light by the Foucault method. The construction of the instrument and the mode of handling it enabled a very large angle of deviation to be obtained; and thus an extraordinary degree of precision in the result was hoped for. Although this hope was not completely fulfilled, nevertheless, the concluded value is far in advance of all previous determinations.

Shortly after, Professor Newcomb exhaustively treated the transits of Venus in 1761 and 1769 with the object of obtaining the constant of solar parallax and the position of the node of Venus.

In another memoir was derived the value of the constant of nutation from material afforded by observations with the transit circles of Greenwich and Washington.

Professor Newcomb deemed that improvements could be made in the mode of deriving the periodic expressions needed in the subject of planetary perturbations. His method of treatment is elaborated in a memoir in the *American Journal of Mathematics,* Vol. III., and, at greater length, in a second memoir in the *Astronomical Papers,* Vol. III.; and, finally, application is made to the four interior planets in a third memoir contained in the latter volume. For certain long-period inequalities in these planets it was found convenient to employ expressions involving time-arguments; this led to the composition of two memoirs in Vol. V., of the same collection.

The secular variations of the elements of these planets are derived and the mass of Jupiter determined from observations of Polyhymnia in the two following memoirs of the same volume.

Professor Asaph Hall having found that there was a rather rapid retrograde motion of the line of apsides of Hyperion, Professor Newcomb explained this from the point of view of the variation of elements. By an inadvertency at the very end of his memoir he failed to obtain a correct value for the mass of Titan, the disturbing body.

The completion of these preliminary investigations enabled Professor Newcomb to proceed at once to the composition of a me-

moir on the elements of the four inner planets and the fundamental constants of astronomy, which appeared as a supplement to the *American Ephemeris* for 1897. This memoir contains the data on which are founded the tables of these planets, published shortly after. In 1899 Professor Newcomb completed his work on the six major planets, he had undertaken to revise, by the publication of tables of Uranus and Neptune.

While all these investigations in the planetary theories were going on Professor Newcomb must have found time for attacking his subject of predilection, the lunar theory, for we have a lengthy memoir by him on the action of the planets on the moon, contained in the volume last mentioned. This paper must have cost him an enormous amount of labor; he seems to be determined that no inequality of sensible magnitude should escape him.

The tables of the planets being out of the way, Professor Newcomb next turned his attention to the fixed stars. Being present at the Paris Conference of 1896 on a common international catalogue of fundamental stars, he obtained the assignment of the subject of precession as his share of the work to be undertaken. Within a year he had the work done, having derived a value of the principal constant involved which is probably as good as the condition of the data at the time allowed.

This memoir is naturally followed by another containing a catalogue of more than 1,500 stars reduced to an absolute system and to be employed as fundamental.

In March, 1897, Professor Newcomb, having arrived at the age limit, was retired from the office of the *American Ephemeris*. Many of his unfinished jobs were carried to completion under the nominal superintendence of others.

At the foundation of the Carnegie Institution of Washington Professor Newcomb secured the privilege of prosecuting his researches on the motion of the moon under its auspices. Here, until the end of his life, he labored assisted by a small but very able corps of assistants. Although the period of time was short a long memoir on the planetary inequalities has appeared.

The last contribution of Professor Newcomb to science is an article in the *Monthly Notices* for January, 1909, exhibiting the deviations of the moon's mean longitude from the best theory that, so far, has been devised.

In the intervals of leisure between his labors of a more technical kind Professor Newcomb composed a book on "Popular Astronomy." Although the rapid advance of the science in the more than thirty years since its publication has caused it to fall behind, it still remains the best composition on the subject.

Professor Newcomb contributed a vast number of notes on almost every conceivable topic in astronomy and the allied sciences to the scientific periodicals. (In this connection it may be useful to state that the Royal Society of Canada has published a bibliography.) He had the management of the construction of tables for the Watson asteroids. He found time to treat questions in economics and psychics and even wrote a novel. No matter how many tools he had in the fire, he was always ready to add to them. His journeys to observe total solar eclipses, transits of the interior planets and to collect scientific data from the observatories and libraries of Europe are too numerous for mention.

With almost universal consent, it is admitted that, for the last forty years of his life, Professor Newcomb stood at the head of the cultivators of the astronomy of position. And he did not have to complain of lack of appreciation by his fellows: after he had got fairly started in his sci-

entific career, a continual flow of medals, prizes, degrees and honorary memberships in scientific societies came for his reception, till the possibilities were exhausted. His departure leaves a great gap in the band of astronomers. It will be long before we again have one of equal untiring energy.

G. W. HILL

SIMON NEWCOMB

IN the death of Professor Newcomb American astronomy has lost its chief ornament and American science in general one of its most commanding figures. His exact relation to contemporary science must be determined by the judgment of future times but to those who have been his associates during any part of the past half century his career bulks too large for oblivion, too generous to be dismissed without some word of appreciation. The common incidents of his life, its offices and honors, may here be dismissed summarily since he has given in his "Reminiscences of an Astronomer," an autobiography that must always remain their most authentic exposition.

Born in Nova Scotia, of New England ancestry, and returning in early manhood to the land of his fathers, there to build a scientific career upon a youthful experience containing scant preparation for such work, he found in the Nautical Almanac office, then at Cambridge, Mass., a position which he himself describes as his first introduction to the world of sweetness and light. Appealing equally to his tastes and talents this work upon the almanac proved decisive of his whole career in which for fifty years problems of celestial mechanics constituted the core about which all other activities centered. Even upon his deathbed his mind was fixed upon the last of the problems that had been marked out as his life work and with its completion he sank visibly and rapidly to the end. Newcomb was, however, far from being a man of one idea. During his long professional career duty and inclination alike brought him into relation with nearly every phase of astronomical activity; popular exposition and the writing of text-books, the design and use of astronomical instruments, research into astronomical history and the utilization of its ancient materials, the organization of individual effort either for such special cases as a transit of Venus and a congress of science, literature and art or for continuous relationship in a permanent scientific body, such as the Astronomical and Astrophysical Society of America or the National Academy of Sciences in both of which he was active and influential. The newer fields of spectroscopic and photometric research in astronomy into which he did not profess to enter as an investigator, commanded his active interest and especially in his later years he was solicitous to combine their results with those of the older branches into a consistent whole.

But no one science, however diverse its paths, seemed to Newcomb an adequate field for the exercise of his powers and numerous were his excursions beyond the bounds of astronomy, *e. g.*, into economic theory, physics, politics, fiction and occult psychic phenomena, most of which, however, can be expected to contribute but little to his permanent fame. In the field of his first choice, theoretical astronomy, while his attainments were large and his powers great, it may be doubted whether posterity will rank his work as of the first order. His greatest achievements unquestionably lie in the border land between theory and practise where an enormous body of observed data has been utilized by an army of computers under

his direction and guidance, in determining the fundamental constants of astronomy, together with the elements of the planetary orbits, and in building upon these tables of the motions of the planets and the positions of the fixed stars that are now in daily use by the astronomers of the world.

Recognition and honors came to him in most unusual degree and from the most diverse sources, but his medals and diplomas, although obviously prized, were rarely exhibited. The ornaments of his home were his three daughters and his wife, Mary Hassler, to whom he was married in 1863. All of these survive him. Although socially inclined and fond of the amenities of life, Newcomb's leonine appearance and conscious dignity of bearing were not infrequently a source of awe to younger men who found it difficult to cross the supposed barrier between them. To the dullard or impostor the barrier was sometimes made real by a word of cutting sarcasm, but toward what he conceived to be real merit Newcomb was always singularly appreciative, seeking to bring out the man of promise and to secure for him recognition through every legitimate means. By none save his own kin will his departure be more sincerely mourned than by his juniors in astronomy whose careers have been furthered by his kindly aid.

G. C. C.

THE ANNUAL REPORT OF THE UNITED STATES COMMISSIONER OF EDUCATION FOR 1908

A FEW years since on the editorial page of the most dignified of our semi-popular magazines it was remarked with facetious seriousness that the annual report of the United States Bureau of Education was without exception "the dullest book in the world." Deserving or not of this charge, it will be generally admitted that the two fat, black-garbed volumes, the issuance of which had become an annual habit of the bureau, did possess, for both the initiated and the disinterested, a forbidding outwardness, which was not much altered by a survey of the twenty-five hundred odd pages of contents. Whatever their value to the cause of American education, very great in the credited judgment of many, these reports were not for those who would read as they ran. However this may have been in the past, within the brief three years of his commissionership, Dr. Elmer Ellsworth Brown has wrought reforms in the publications of the bureau which are certain to develop a more wide-spread recognition of the genuine service which it is possible for the federal government to render to American schools and American education. The annual report of the bureau for 1908 well illustrates the more important of these reforms; attractiveness in make-up, promptness of publication, condensation of contents, timeliness of topics, simplification and interpretation of the detailed array of statistics, and a cautious editorial supervision.

For the first time since the establishment of the bureau the funereal black binding of the report has been discontinued and the volumes appear in an artistic soft toned olive. This is a reform certainly meriting commendation. Why should not the publications of the Bureau of Education have advantage of an inviting exterior? Perhaps, too, the influence of the example may be felt with the official publications of other governmental departments and bureaus.

The prompt appearance of the report—the first volume being distributed before the close of 1908 and the second early in 1909—greatly enhanced its value. Formerly the annual reports of the bureau were one or two years behind. There were undoubted obstacles in the way of prompter publication which were not easily overcome. That they could be overcome has been effectively demonstrated, much to the relief of those who believe that the Bureau of Education should furnish authentic data and information concerning education at a time and in a form to be of largest service.

By reducing the size of the report from twenty-five hundred pages to somewhat more

than a thousand, chiefly through the condensation of statistical matter, and confining this matter to the second volume of the report, by a skilful selection of topics of wide contemporary interest and of avowed timely value, by simplifying and giving a scientific interpretation of the mass of statistical detail, and above all, by the very noticeable care with which the editorial supervision has been conducted, the report represents the accomplishment of a leadership that appreciates both the opportunities and the obstacles of the work of the bureau.

Commissioner Brown's general introduction in the first volume is a briefly expressed, yet comprehensive, survey of contemporaneous educational conditions and progress, not only in the United States but throughout the principal countries of the world. This, together with the first chapter, in which are given succinct discussions of the more significant educational events of the year, covering the widest range of topics—international educational relations, international congresses, educational commissions, educational boards and associations, teachers' colleges, national university, industrial education, school hygiene, high-school fraternities, teachers' pension funds, being among the important ones—are well worth the reading by every one who would be alive to the educational movements of the day. The classified summaries of state legislation relating to public education for the years 1906–1907 and 1907–1908 contained in the second chapter are invaluable indices of the character and direction of our educational progress. This chapter also contains a statement of the several enactments of the first session of the Sixtieth Congress which have a direct or indirect bearing on education.

The remainder of the first volume of the report is given over to the usual presentation of the more important items of the educational affairs in Porto Rico, Philippines, South America, Great Britain and Ireland, France and central Europe. In these days of comparative study, these chapters will have great value, not only for the student, but for the publicist as well.

Decidedly the most important and most welcome reform of which the 1908 report bears evidence has to do with the statistics of education—the reef upon which many a good official report ship has been wrecked. This reform was begun in the preceding report under the direct supervision of Professor E. L. Thorndike, of the Teachers College, Columbia University. Not only in the present report have the tables of statistical items been rearranged and effectively condensed, but an excellent interpretative summary accompanied by appropriate frequency curves has been prepared by Professor G. D. Strayer, of the Teachers College, Columbia University. Commissioner Brown has effected a much-needed change in the matter of the statistical work of the bureau, and while yet our educational statistics are not as complete or as intelligible as they need to be, this last report exhibits the longest stride of progress yet made.

Were perchance awards of merit made for prodigality of publication and distribution, for ponderousness of bulk and content and for procrastination of presentation, such would, without doubt by common consent go to the generality of annual reports of governmental departments and bureaus. To this generality there is at least one notable exception, and all workers in the field of education are glad to have this exception come from the United States Bureau of Education.

EDWARD C. ELLIOTT
UNIVERSITY OF WISCONSIN

THE MUSEUM EXHIBITIONS IN CONNECTION WITH THE HUDSON-FULTON CELEBRATION

IN an article published in the *North American Review* seven years ago,[1] the writer prophesied that, if the various museums and institutions in the city of New York could be induced to combine their efforts, a series of exhibitions might be presented which would constitute a most valuable addition to a Hudson-Fulton Celebration. About one year ago the trustees authorized the president of the Hudson-Fulton Commission to appoint com-

[1] "On Expositions and their Uses," *North American Review*, September, 1902.

mittees to take up museum work. He appointed the following committees:

Art and Historical Exhibits Committee.—Mr. J. Pierpont Morgan, general chairman.

Sub-committee in Charge of Scientific and Historical Exhibits.—Dr. George F. Kunz, chairman, 401 Fifth Avenue, New York; Mr. Samuel V. Hoffman, Mr. Archer M. Huntington, Professor Henry Fairfield Osborn, Mr. Philip T. Dodge.

Sub-committee in Charge of Art Exhibits.—Hon. Robt. W. de Forest, chairman, Metropolitan Museum of Art; Sir Caspar Purdon Clarke, Dr. Edward Robinson, Mr. George F. Hearn, Dr. George F. Kunz.

When the Art and Historical Committee was formed, the writer accepted the chairmanship of the sub-committee on Scientific and Historical Exhibits, and in cooperation with the members of this sub-committee and those of the sub-committee on Art Exhibits, was successful in realizing a most gratifying result. The ready response to requests for suitable exhibits has indicated the general interest aroused by the celebration.

The special exhibits noted in the following list have been carefully selected to emphasize the essential character of the occasion, so that they may give to the visiting thousands a more immediate and intimate knowledge of the conditions obtaining in Henry Hudson's time, and of the initiation and development of steam navigation, than could be secured by the study of the text-books and histories that treat of these matters. They will be glorious object lessons and will serve to arouse a feeling of civic pride in our citizens, and also to impress those who come from all parts of our land with the greatness and historic importance of our metropolis, and will powerfully stimulate the taste for art, science and history.

May this grand celebration, in all its various forms and phases, help to arouse, not only civic pride, but also civic virtue, so that the future progress of our city in material greatness and spiritual worth may testify to the permanent effects produced by it.

The following carefully prepared list of museums and institutions, with the time, place and duration of the free exhibitions, may be of value, as a reference, to the scientists, and we herewith append them.

American Museum of Natural History, Seventy-seventh Street, from Columbus Avenue to Central Park West. Open daily, except Sundays, from 9 A.M. to 5 P.M.; Sundays from 1 to 5 P.M. Always free. Special exhibition during the Hudson-Fulton Celebration, from September 1 to December 1. Original objects showing the life and habits of the Indians of Manhattan Island and the Hudson River Valley. (Special illustrated guide for sale, price, ten cents.)

American Society of Mechanical Engineers, Engineering Building, 29 West Thirty-ninth Street. Robert Fulton exhibition, consisting of paintings, drawings, books, decorations and furniture, and working models of John Fitch's steamboat, the first boat operated and propelled by steam, Robert Fulton's *Clermont*, the first successful application of steam to navigation, and John Stevens's *Phœnix*, the first steamboat to sail on the ocean. The exhibition will be shown in the council room of the society, on the eleventh floor, and will be open from 9 A.M. until 5:30 P.M. during the entire period of the Hudson-Fulton Celebration, and from 9 A.M. until 5 P.M. daily until December 6.

Brooklyn Institute, Eastern Parkway. Open daily, except Sundays, from 9 A.M. to 6 P.M.; Sundays from 2 to 6 P.M.; Thursday evenings from 7:30 to 9:30 P.M. Free except on Mondays and Tuesdays, when admission fee is charged of twenty-five cents for adults and ten cents for children under six years of age. Collections illustrating various departments of archeology, mineralogy and ethnography. Special exhibition relating to past and present life of Indians on Long Island. Portrait of Robert Fulton painted by himself, the property of Col. Henry T. Chapman and loaned by him to the museum. Open September 1 to December 31. (Illustrated catalogue for sale.)

Children's Museum (*Brooklyn Institute*), Bedford Park, Brooklyn Avenue. Collection illustrative of the fauna of Long Island. Open free to the public from Monday to Saturday (inclusive) from 9 A.M. to 5:30 P.M., and on Sunday from 2 until 5:30 P.M.

City History Club of New York, 21 West Forty-fourth Street. Special exhibition of illustrations, photographs, maps and plans relating to the history of the city of New York, and all of the originals used in the City History Club Historical Guide Book of the City of New York.

College of the City of New York, St. Nicholas Avenue and 139th Street. Hudson-Fulton exhibit. During the Hudson-Fulton Celebration and for some weeks thereafter, the College of the City of New York will have on exhibition in its historical museum a collection of charts, views, manuscripts and relics representing old New York. Among the charts will be original prints of New Netherlands and New Amsterdam by Nicholas J. Vischer, about 1650; N. Visscher, 1690; Lotter's "New Jorck," 1720; contemporary plans and views of the revolutionary period showing the movements of Washington and Howe in this vicinity during the campaign of 1776; revolutionary battle relics; portraits, residences and letters of old New Yorkers; bronze busts of Washington, Lincoln and Fulton by Houdon and Volk; and other material suggested by the celebration.

Department of Parks, Boroughs of Brooklyn and Queens. Through the courtesy of Commissioner Michael J. Kennedy, the different species of trees have been labeled in Prospect Park, from the Plaza to the Willink entrance; in Bedford Park; in Highland Park, and in Tompkins Park. An additional small enameled sign has been hung on those labeled trees that were indigenous to the Hudson River Valley in 1609. The special label reads: "This species is a native of the Hudson River Valley."

Fraunces Tavern, 54 Pearl Street, near Broad Street. Historic revolutionary building. Built in 1719. Scene of Washington's farewell to his officers on December 4, 1783. Restored December 4, 1907, by the New York Society of the Sons of the Revolution. Open daily, except Sundays, from 9 A.M. to 6 P.M. Special exhibition of revolutionary relics by the New York State Society of the Sons of the Revolution, who are the owners of the historic building, September 15 to November 1.

Long Island Historical Society, corner of Pierrepont and Clinton Streets, Brooklyn, between Brooklyn Bridge and Borough Hall. Open daily, except Sundays, from 8:30 A.M. to 6 P.M. Reference library of 70,000 volumes; manuscripts, relics, etc. Autograph receipt of Robert Fulton and original manuscript volume of Danker's and Sluyter's "Journal of a Voyage to New York in 1679–80."

Metropolitan Museum of Art, Central Park East. Main entrance on Fifth Avenue at Eighty-second Street. Open daily, except Sundays, from 10 A.M. to 6 P.M.; until December 31, to 5 P.M.; Saturdays to 10 P.M.; Sundays from 1 to 6 P.M. On Mondays and Fridays an admission fee of twenty-five cents is charged, except to members and copyists. Collections illustrating all departments of art and archeology. Special exhibition of a magnificent collection of over 130 of the works of seventeenth century Dutch masters, constituting the finest exhibition of this kind ever made. Products of colonial art: American paintings, furniture, pewter and silver of the seventeenth and eighteenth centuries, etc. (Two catalogues for sale, one of Dutch exhibit and one of colonial arts; price, ten cents each. Also finely illustrated edition de luxe.)

National Arts Club, Twentieth Street near Irving Place (Gramercy Park). This house was formerly the residence of Samuel J. Tilden, and is situated one block east of the birth-place of ex-President Roosevelt. Open daily from September 20 to about October 18, 1909, from 10 A.M. to 6 P.M. Special loan exhibition by the National Arts Club, in cooperation with the American Scenic and Historic Preservation Society. Three centuries of New York City: special exhibition of paintings, photographs, drawings and other interesting materials, illustrating the growth and progress of New York from the time of Henry Hudson to the present day.

New York Aquarium, in Battery Park. Under the management of the New York Zoological Society. Open daily, including Sundays, from 9 A.M. to 5 P.M. until October 15. (October 16 to April 14, from 10 A.M. to 4 P.M.) This building was erected in 1807 by the United States government as a fort and after the war of 1812 was called Castle Clinton; later, as Castle Garden, it was the scene of Jenny Lind's triumphs, and from 1855 to 1890 it was the portal of the New World for 7,690,606 immigrants. This is the largest aquarium in the world and contains a greater number of specimens and species than any other. All tanks containing fish indigenous to the Hudson River will be so marked.

New York Botanical Garden, Bronx Park. Museums open daily, including Sundays, from 10 A.M. to 5 P.M.; conservatories from 10 A.M. to 4 P.M. Grounds always open. In the grounds and conservatories exhibits of plants, shrubs, trees and natural woodland; in the museums, plant products utilized in the arts, sciences and industries. All trees growing on Manhattan Island and in the Hudson River Valley at the time of Hudson's arrival are marked with the letter "H." (Special illustrated catalogue for sale.)

New York Genealogical and Biographical Society, 226 West Fifty-eighth Street, between Broadway and Seventh Avenue. Open daily, ex-

cept Sundays, from 10 A.M. to 5 P.M., until November 1. Special exhibition of old deeds, manuscripts, books, portraits, etc., relating to the history of the United States up to and including the war of 1812. (Catalogue for sale.)

New York Historical Society, corner of Seventy-seventh Street and Central Park West. September 25 to October 30, open daily from 9 A.M. to 5 P.M. Robert Fulton exhibition of the New York Historical Society, in cooperation with the Colonial Dames of America. (Catalogue for sale.)

New York Public Libary, Lenox Branch, Fifth Avenue and Seventy-second Street. Open daily, except Sundays, from 9 A.M. to 6 P.M. Special exhibition of prints, books, manuscripts, etc., relating to Henry Hudson, the Hudson River, Robert Fulton and steam navigation. (Special illustrated catalogue for sale; price, ten cents.)

New York Zoological Park, under the management of the New York Zoological Society, St. Nicholas Avenue (138th to 140th Streets), in Bronx Park. Open daily, including Sundays, from 9 A.M. until an hour before sunset (November 1 to May 1 from 10 A.M.). Free, except on Mondays and Thursdays, when an admission fee of twenty-five cents is charged. Exhibition of a splendid collection of animals, birds and reptiles. The fauna of Henry Hudson's time on Manhattan Island and in the Hudson River Valley will be indicated by the flag of the Hudson-Fulton Celebration. (Special illustrated catalogue for sale.)

Reformed Dutch Church. The Reformed Protestant Dutch Church of the City of New York will make an exhibit in the chapel of the church of St. Nicholas, Fifth Avenue and Forty-eighth Street, during the week of the celebration, 9 A.M. to 5 P.M. daily. (This church was organized A.D. 1628, and the exhibit will comprise articles connected with its long history.)

Van Cortlandt House Museum, in Van Cortlandt Park. This fine colonial mansion, built in 1748, with furniture of the period, is one of the oldest houses within the area of Greater New York; it is in the custody of the Colonial Dames of the State of New York. Open daily, 9 A.M. to 5 P.M. Special exhibition of mezzotint portraits of men prominent in political life prior to the revolution; Wedgwood's medallion portraits of illustrious personages; cartoons and caricatures of political events, etc. (Special illustrated catalogue on sale.)

Washington's Headquarters (*The Jumel Mansion*), Roger Morris Park, Edgecombe Road and One Hundred and Sixty-second Street. Built about 1760. Under the Department of Parks. Exhibition by the ladies of the Washington Headquarters Association, Daughters of the American Revolution. Open free daily, including Sundays, from 9 A.M. to 5 P.M. Special features: collection of colonial furnishings, objects and pictures; also the Bolton collection of war relics of the revolution.

American Geographical Society, 15 West Eighty-first Street. Special exhibition of books and maps relating to Henry Hudson and Robert Fulton. Admission can be obtained by card. Apply to the librarian, 15 West Eighty-first Street. Open from September 25 to October 9, from 9 A.M. to 5 P.M.

GEORGE F. KUNZ,
Chairman Historical and Scientific Exhibitions, Hudson-Fulton Celebration Commission, Tribune Building, New York

SCIENTIFIC NOTES AND NEWS

IN connection with the celebration of the twentieth anniversary of Clark University, honorary degrees have been conferred as follows: *Doctor of Laws*—Percival Lowell, Boston; Ernest Fox Nichols, president of Dartmouth College; William Fogg Osgood, Harvard University; James Pierpont, Yale University; Hermon Carey Bumpus, director of the American Museum of Natural History; Leo Burgerstein, University of Vienna; Carl Barus, Brown University; Franz Boas, Columbia University; Sigmund Freud, University of Vienna; Herbert Spencer Jennings, Johns Hopkins University; Carl G. Jung, University of Zurich; Adolf Meyer, Johns Hopkins University; L. William Stern, University of Breslau; Edward Burr Van Vleck, University of Wisconsin; Robert Williams Wood, Johns Hopkins University. *Doctor of Physics*—Vito Volterra, University of Rome; Albert Abraham Michelson, University of Chicago; Ernest Rutherford, University of Manchester, England. *Doctor of Letters*—Edward Bradford Titchener, Cornell University. *Doctor of Biology*—Charles Otis Whitman, University of Chicago. *Doctor of Mathematics*—Eliakim Hastings Moore, University of Chicago.

DR. HENRY FAIRFIELD OSBORN, of New York, has been elected a corresponding member of the Senckenberg Natural History Society at Frankfort.

AT the recent meeting of the Association of Edison Illuminating Companies, of New York City, a dinner was given to Mr. Thomas A. Edison. Among those who spoke were Mr. W. W. Freeman, the retiring president of the association, Mr. Thomas E. Murray, the incoming president, and Dr. Charles P. Steinmetz.

A LUNCHEON complimentary to Dr. Henry B. Ward, dean of the medical department of the University of Nebraska, was given by his colleagues at Omaha, on September 3, and, at the same time, the presentation of a gold watch was made to him. Dr. Ward, it will be remembered, has accepted the chair of zoology in the University of Illinois.

DR. MORITZ CANTOR, professor of mathematics at Heidelberg, has celebrated his eightieth birthday.

DR. OSCAR LENZ, professor of geography at Prague, has retired from active service.

PROFESSOR ALBRECHT PENCK, who lectured last winter at Columbia University, has returned to Berlin after visiting the Sandwich Islands and Japan.

PROFESSOR MORGAN BROOKS, of the electrical engineering department of the University of Illinois, has a year's leave of absence and will take a trip round the world, first spending about three months in Europe.

THE following members of the Bureau of Longitudes will represent France at the International Geodetical Congress which is to be held in London on the twenty-first inst.: General Bassot, president of the society, M. Henri Poincaré, M. Hanusse, director of hydrography in the French Ministry of Marine, M. Charles Lallemand, director-general of the French Ordinance Survey Department, and Colonel Bourgeois, chief of the surveying section of the geographical department of the War Office.

A. H. SUTHERLAND, Ph.D. (Chicago), has been appointed and has taken up his duties as assistant in psychology at the Government Hospital for the Insane, Washington.

IT is stated in *Economic Geology* that at the request of the Canadian Geological Survey for the loan of a topographer, the United States Geological Survey has granted R. H. Chapman leave of absence for one year and he is at present engaged in topographic work for the Canadian government.

MISS JULIA MCCORD, who has been assistant librarian of the United States Geological Survey for a number of years, has been made librarian.

DR. PAUL LANGHANS has become editor of *Petermann's Mitteilungen,* to succeed Dr. Supan, who has been called to the chair of geography at Breslau.

DR. HENRY C. CHAPMAN, professor emeritus in the Jefferson Medical College, Philadelphia, and known for his work in physiology, anatomy and medical jurisprudence, died at his summer home in Bar Harbor, on September 7, aged sixty-four years.

DR. RADCLIFFE CROCKER, of London, known for his contributions to dermatology, has died at the age of sixty-four years.

DR. KARL HABERMANN, professor in the Mining Academy at Leoben, died on August 20.

THE death is also announced of Dr. Valentino Cerrutti, professor of mathematics at the University of Rome.

THE autumn meeting of the American Physical Society will this year be held at Princeton University, on Saturday, October 23. This date has been chosen on account of the opening of the new Palmer Physical Laboratory, which will take place on the evening of October 22.

THE National Museum of Wales, of which Dr. W. E. Hoyle is director, at Cardiff, will have a new building to be erected at a cost of £250,000. It will include the following exhibition galleries: history and antiquities; geology and mineralogy; Welsh natural history; zoology and botany; industries; art; children's room; aquarium.

THE next International Congress of Mining, Metallurgy, Applied Mechanics and Practical Geology, will be held at Düsseldorf during the last week of June, 1910.

The Missouri State Soil Survey and the United States Soil Survey have united on a plan of cooperative work. Each survey contributes $15,000 for the biennial period, 1909–11. Professor C. F. Marbut, director of the Missouri Survey has been appointed special agent in charge. He will also have charge of the reconnoissance work in the Ozark region of Missouri and Arkansas. The local detailed work and the selection of areas to be surveyed are largely decided by the state survey and the broader correlations and nomenclature are largely left to the United States Survey. The federal survey assumes the expenses of publication. Each soil party consists of one man from the United States Survey and one from the state survey. It is expected that from four to five counties will be surveyed each year.

Sir William Hartley, of Liverpool and London, offers £1,000 to the first person who makes a successful flight in a heavier-than-air machine between Liverpool and Manchester. The aviator is to depart from within the boundary of Liverpool and land, without any intermediate stop, within the boundary of Manchester. The offer is international and will last for six months, the flight to be made between sunrise and sunset and twelve hours' notice to be given to the *Liverpool Daily Post and Mercury,* in whose hands the competition is placed.

The government's work in poisoning prairie dogs on infested stock ranges in the Missoula National Forest district has had results this year which forest officers have decided warrant its continuation in 1910. For two years systematic efforts upon an extensive scale have been made by the Forest Service in cooperation with the stockmen, to rid the national forest ranges in Arizona, Colorado and New Mexico of these pests, but this work was not undertaken in the northwest until the spring of 1909. Eastern Montana and the Dakotas seem to be the worst-infested portion of the Missoula district. The national forest areas of these regions are comparatively small, but in some instances the colonies or towns of these animals cover an area of several hundred acres and the native forage plants have been greatly injured, while some range areas outside the forests have been practically devastated. In the spring of the present year small allotments of funds were made to the supervisors of the Custer and Sioux National Forests for the purpose of starting this work. The funds were for the most part expended in purchasing strychnine and other drugs used in preparing grain for bait, while the grain was furnished by the settlers. The poisoned grain, usually wheat, was distributed at the holes throughout the dog towns, both by forest officers and by forest users. More time was consumed in perfecting the plan of cooperation than had been anticipated and much of the bait was put out too late to obtain the best results, though several large dog towns were entirely cleaned up. Experience has proved that the grain should be put out very early in the spring for the best results may be obtained before green grass becomes available.

UNIVERSITY AND EDUCATIONAL NEWS

The five hundredth anniversary of St. Andrews University will take place in 1913. At a recent meeting it was agreed to arrange for a national as well as an academic celebration. It has been resolved to form a general committee representing Scottish interests and sympathies, to fix the date of the celebration, and to endeavor to associate with the festival some permanent memorial of the anniversary.

The number of foreign students at the German universities last summer was 3,921. The number includes 1,578 Russians, 674 Austro-Hungarians, 306 Swiss, 155 English, 154 Bulgarians, 102 Rumanians, 68 Servians, 60 French, 298 Americans, 175 Asiatics and 4 Australians.

Five scholarships and two fellowships have been awarded by the College of Agriculture of the University of Wisconsin. The two fellowships of $400 each recently provided by the regents were awarded to Alvin C. Oosterhuis, Sheboygan Falls, Wis., in animal husbandry, and Morris W. Richards, Madison, Wis., in horticulture.

DR. M. J. M. HILL, F.R.S., professor of mathematics in the University College, has been elected vice-chancellor of the University of London for 1909–10.

DR. WALTER MURRAY, of the University of Dalhousie, Halifax, has been elected president of the new University of Saskatchewan, established at Saskatoon.

DR. ALLEN J. SMITH, professor of pathology, has been appointed dean of the medical department of the University of Pennsylvania, to succeed Dr. Charles H. Frazer.

THE *Journal* of the American Medical Association states that Dr. H. McE. Knower, of the anatomical department of the Johns Hopkins University, has accepted a call to the University of Toronto, and Dr. Robert Retzer, of the same department, a call to the University of Minnesota.

DR. JOHN C. SHEDD has accepted the chair of physics in Olivet College.

DR. IRVING KING, who has been assistant professor in education at the University of Michigan for the past two years, has been called to the department of education in the State University of Iowa.

MESSRS. W. F. STEVE and PAUL DIKE have been appointed instructors in physics, and Messrs. Rufus A. Barnes and James Curry have been appointed instructors in chemistry in the University of Wisconsin.

THE following promotions and appointments have been made at Northwestern University: Dr. David Raymond Curtiss has been advanced from an associate professorship in mathematics to a full professorship. Dr. Robert R. Tatnall from associate professor of physics to professor of physics; Robert E. Wilson from instructor in mathematics to assistant professor in mathematics; Dr. Eugene H. Harper from instructor in zoology to assistant professor of zoology; Dr. James Caddell Morehead from instructor in mathematics to assistant professor of mathematics; Dr. Robert H. Gault has been appointed instructor in psychology; Dr. Charles S. Mead instructor in zoology, and Dr. Leigh Hunt Pennington instructor in botany.

DR. THOMAS H. BRYCE, lecturer in anatomy in the University of Glasgow, has been appointed to be regius professor of anatomy in succession to Professor John Cleland.

DR. JOHN MARNOCH, lecturer on clinical surgery at the Aberdeen Royal Infirmary, has been appointed regius professor of surgery in the University of Aberdeen in succession to Professor Alexander Ogston.

M. BOREL has been appointed professor of the theory of functions at the University of Paris.

DISCUSSION AND CORRESPONDENCE

GENERA WITHOUT SPECIES

IN his communication on this subject published recently in SCIENCE,[1] Mr. Caudell renders it clear that my reference[2] to certain correspondents cited by Professor Cockerell in a previous issue of SCIENCE[3] as being either ignorant or inexperienced in some of the more difficult questions in nomenclature was not without warrant, at least in the case of one of the persons mentioned by Professor Cockerell. Inasmuch as Mr. Caudell, in his reply to my communication, has misrepresented (apparently unconsciously) my position in the case, I beg space for a few words more on the general subject of genera without species and other matters incidental thereto.

The logical inference from the general tenor of his article is that I am opposed to the International Code of Nomenclature, and would allow personal opinion to intervene in opposition to its rulings. On the contrary, I have been not only loyal to the International Code in all its bearings but have, in various papers published during the last two years, strenuously advocated its acceptance as *the* definitive code, in so far as its rulings meet the cases that are constantly arising in zoological nomenclature. Furthermore, where cases arise that are not clearly covered by the code I have urged that such cases be referred to the Nomenclature Committee of the International

[1] Vol. XXX., pp. 210, 211, August 13, 1909.

[2] SCIENCE, Vol. XXIX., pp. 934–936, June 11, 1909.

[3] Vol. XXIX., pp. 813, 814, May 21, 1909.

Zoological Congress for arbitration, and that its decision be accepted as final. Still further, I have already submitted a number of such questions to this committee for decision, and stand ready to accept its decision of them, even should it chance to be adverse to my own personal views in the matter. This should answer Mr. Caudell's assumption, or at least insinuation, that I "hold that personal judgment should enter into the solving of this important problem" of genera without species, and that I am committed to "methods where personal opinion is given full sway." The tendency shown in frequent articles in SCIENCE and in various other scientific journals[4] to refer difficult questions in zoological nomenclature to a committee of arbitration, whose decision, right or wrong, shall be final, I consider one of the most hopeful signs for the future in the nomenclatural field.

To come now to the particular question under discussion, namely, genera without species. In my former paper on this subject I claimed that each so-called speciesless genus should be considered by itself, on its own merits. As said before, it was considered the correct thing, a century ago, for a systematist to publish a synopsis of a class of animals, giving merely diagnoses of the generic and higher groups; at least many such synopses were published, and were then held in favorable estimation. Most of the genera in such cases had been already established by previous authors and stand, of course, on the basis furnished them by their founders, and had originally one or more species referred to them, but of course were without designated types. In these systematic synopses some new genera were proposed, which, if not homonyms, and were not given preoccupied names, have been accepted and long since became part of the established nomenclature of systematic zoology. There were not, however, full-fledged and properly habilitated genera, from the modern view-point, until the necessity for genotypes became recognized and types for them had been duly designated.

Apparently Mr. Caudell does not see anything very absurd in recognizing an ornithological genus based on an unmentioned three-toed woodpecker, but thinks the case would be quite different with a genus based on an unmentioned species of hymenopterous or dipterous insect with a particular kind of forking of a wing-vein. I agree with him perfectly on both these points, for in the one case the species on which the genus was based is identifiable and in the other it is not. I am perfectly well aware that there are hundreds of speciesless genera that are absolutely unidentifiable, and that they are especially the bane of entomology. In every instance they should be rejected; but they can not be wholly ignored, since, as they are not *nomina nuda*, the name given them is preoccupied for further use in zoology.

The whole question of genera without species is badly muddled by bringing into it irrelevant matters. It is not difficult to decide what named groups are entitled, from the standpoint of the author who proposed them, to be regarded as "genera" (and in this connection subgenera must come into the same category), or have been recognized as genera in literature. The only point is whether they are good genera or bad genera—in other words, whether they are identifiable or unidentifiable from the basis furnished by the original founder. Of course there may be differences of opinion as to whether or not a certain genus is identifiable; but this is a question of zoology and not of nomenclature, although the result of any decision on the point will necessarily affect nomenclature. The simile of "a family of Smiths without a John or a Jane in it," or "a name Johnson before any one was born to bear it," is, to my mind, wholly beside the case; as is also Mr. Caudell's assumption that "a genus without a species has no object; it is a name applied to a conception, not to an object, and can therefore have no place in systematic nomenclature." This, it strikes me, is *reductio ad absurdum*. Identifiable genera without spe-

[4] See especially Dr. W. H. Dall's "A Nomenclatural Court?" SCIENCE, Vol. XXX., pp. 147–149, July 30, 1909; and Dr. F. A. Bather, in *Ann. and Mag. Nat. Hist.* (8), Vol. IV., p. 41, July, 1909.

cies are based on previously known species whose characters are, in part at least, recognizably expressed in the diagnosis of the genus. When they are not, such genera have no basis and must necessarily be considered as non-existent.

J. A. ALLEN
AMERICAN MUSEUM OF NATURAL HISTORY

THE HYPOTHESIS OF "PRESENCE AND ABSENCE" IN MENDELIAN INHERITANCE

IN our last report we gave reasons for regarding the rose-comb as a comb on which an additional element "roseness" has been superposed, and we suggested that the allelomorphic pair consists in the two states: presence of the factor for rose (R) and absence of that factor (r). The rose-comb is in reality a single comb modified by the presence of a "rose" factor. The same considerations apply to the pea-comb, which is single comb plus a pea-factor.[1]

There are reasons for regarding man as a chimpanzee on which an additional element, "manness," has been superposed. There you have man expressed or explained[2] in terms of his anthropoid ancestor. The characters of a frog are undoubtedly latent in the frog's tadpole. What is to hinder, therefore, expressing or explaining the frog in terms of the tadpole by saying the tadpole carries the characters of the frog? The logic is sound in the statement that the tadpole contains "frog factors" or "frogness." The question is merely as to the helpfulness of sound logic used that way.

This seems like the method of reasoning that, as somewhere remarked by Professor William James, would enable Hegel and his followers to successfully support the hypothesis that men are always naked—under their clothes.

I am not ailing with metaphysico-phobia. Quite the contrary: upon occasion I enjoy and can profit by a half-holiday in some cool, shady dell of the land of metaphysics. I recognize, nevertheless, that as a rule it is a misfortune for metaphysics to get mixed with objective science. I recognize further that however unfortunate the mixture may be at its worst when deliberately made, by far the most unfortunate is such a mixture when made all unconsciously on the part of the mixers.

The opening sentence of Huxley's essay "Scientific and Pseudo-scientific Realism" is this:

> Next to undue precipitation in anticipating the results of pending investigations, the intellectual sin which is commonest and most hurtful to those who devote themselves to the increase of knowledge is the omission to profit by the experience of their predecessors recorded in the history of science and philosophy.

Were the distinguished fellow of the Royal Society who wrote these lines living now, and were he a member of that society's evolution committee, he would, suiting action to word, almost certainly have saved his fellow committeemen the labor of discovering that the "allelomorphic pair consists in the two states, presence of the factor for rose (R) and absence of that factor (r)," by referring them to Hegel's "Logic," wherein the "divine principle" of Negativität is so fully and clearly set forth that its applicability to such cases as this becomes unmistakable.

> Difference implicit or in itself is a difference of the essence, and includes both the *positive* and the *negative*, and in this way: The positive is in the identical connection with self in such a way as not to be the negative, and the negative is the difference by itself so as not to be the positive. Thus either is on its own account, in proportion as it is not the other.[3]

Again:

> The foundation of all determinateness is negation (as Spinoza says, *Omnis determinatio est negatio*). Opinion, with its usual want of thought, believes that specific things are positive throughout, and retains them fast under the form of being. Mere being however is not the end of

[1] "Experimental Studies in the Physiology of Heredity," by W. Bateson, Miss Saunders and R. C. Punnett in "Reports to the Evolution Committee of the Royal Society," Report IV., 1908.

[2] A few scholastics, more Abelard-like than the generality in keenness of dialectic, point out that there is an important distinction between "expressing" and "explaining" modern phenomena such as these.

[3] "The Doctrine of Essence," in "The Logic of Hegel," translated by William Wallace.

the matter—it is, as we have already seen, utter emptiness and instability besides.[4]

Thus supplementing the Report of the Evolution Committee of the Royal Society with Hegel's "Doctrine of Being," it becomes clear at once why biology has so long failed to recognize that rose-comb is single comb plus "roseness." It is because "opinion, with its usual want of thought" has failed to perceive that ordinary comb (an instance of "mere being") is "utter emptiness and instability."

So logic scores again!

W. E. Ritter

La Jolla, California,
August 11, 1909

SCIENTIFIC BOOKS

PAPERS FROM THE TORTUGAS LABORATORY

The Carnegie Institution supports three laboratories devoted to biological research, the Desert Laboratory in Arizona, the Station for Evolution on Long Island, N. Y., and the Tortugas Station at the mouth of the Gulf of Mexico, all of which are maintained in the most liberal manner. The Tortugas Laboratory is due to the energy of the present director, Dr. A. G. Mayer, who examined many points in our warmer waters in his endeavors to find the best locality for the study of tropical marine life, and at last decided on the Dry Tortugas, not far from Key West. Each summer he has taken a number of investigators with him and has supplied them with every facility for work. These two volumes[1] of 516 pages, 84 plates and numerous cuts are the results of two seasons' work.

A review of such volumes is difficult. Adequately to criticize the separate papers is not the task of any one person, so varied is their scope. All that can be attempted here is a brief summary of their contents. For this purpose the nineteen papers may be grouped under separate headings.

Four articles, all in the second volume, deal with animal behavior and can not easily be summarized. Dr. R. P. Cowles describes the habits and reactions of the sand crab, *Ocypoda,* and Dr. Charles R. Stockard has a similar paper on the walking-stick, *Aplopus.* John B. Watson studied the habits of two of the terns, while Frank M. Chapman discusses the habits of the booby and the frigate bird.

In Professor Reighard's paper on the colors and habits of coral-reef fishes, which, as is well known, are frequently conspicuously colored, it is pointed out that the theory of warning colors usually advanced does not account for all the facts observed and a theory of immunity coloration is proposed as a substitute, which is defined as follows:

> Coloration, not sexually dimorphic, which renders an organism in its natural environment conspicuous to vertebrates; which has no selective value, since it does not aid the organism in escaping vertebrate enemies by concealment (protective coloration), nor in approaching its accustomed invertebrate prey (aggressive coloration), and when associated with disagreeable qualities is unnecessary as a warning to vertebrate foes of the existence of such qualities (warning coloration); it is conceived to have arisen through internal forces under immunity of the organism from the action of selection on its color characters.

In the first volume Dr. Mayer presents a study of pulsation of medusæ, in which he concludes that the stimulation of pulsation is caused by the formation of sodium oxalate in the marginal sense organs. This reacts on the calcium salts, precipitating calcium oxalate and setting free sulphate and chloride of sodium which act as nerve stimulants. Especially interesting is the way in which a pulsation once started in a ring cut from the medusan tissue may be made to continue in a circular course for days without further stimulation.

Dr. Mayer also returns to his discussion of the Floridan palolo worm, *Eunice fucata,* which at regular dates casts off the hinder sexual part of the body, these amputated portions swarming at the surface in vast numbers. From observations extending over several years, he points out that this occurs commonly within three days of the last quar-

[4] "The Doctrine of Being," *ibid.*

[1] "Papers from the Tortugas Laboratory of the Carnegie Institution of Washington," Volume I., 1908; Volume II., 1908.

ter of the moon which comes in the period between June 29 and July 28.

Four papers are more or less embryological. The late Professor Brooks and Mr. Kellner have a few notes on the embryology of *Oikopleura,* which are of especial interest because of our slight knowledge of the development of the appendicularians. Both eggs and embryos were found attached to the tails of the adults. Brooks and McGlone studied the development of the lung of the snail, *Ampullaria,* and find that gill, lung and osphradium are developed from a ridge in the mantle cavity, forming a series of homologous organs, differentiated for different functions. The lung becomes functional some time before the gill, as young individuals are easily drowned.

Professor E. G. Conklin traces the development of the medusa, *Linerges,* up to the gastrula stage and the free-swimming planula. The sudden appearance of large swarms of the medusæ seems to be connected with reproduction. The medusæ as rapidly disappear, sinking to the bottom and degenerating after depositing the eggs. Dr. Conklin also describes two peculiar actinian larvæ which are assigned to Van Beneden's provisional genera *Zoanthella* (Semper's larva) and *Zoanthina.* The description covers the morphology and histology. All attempts to rear the larvæ to adult conditions were in vain, so that exact relationships are unknown.

Dr. H. E. Jordan has three cytological papers in the first volume. The studies on the spermatogenesis of *Aplopus* seem in the main to be confirmative of the results of Wilson on other forms. Both of the other papers are based upon echinoderms and apparently are part of an attack upon the problem of the continuity of the chromosomes. In *Echinaster* the chromosomes are derived exclusively from the nucleolus, in *Asterias* partly from the nucleolus, and in *Ophiocoma* exclusively from the nuclear reticulum. These results are reconciled by a study of the nuclear constituents which leads to the conclusion that the chromosomes arise from any part that contains chromatin. At least in some forms his studies show little to confirm the idea of chromosome continuity.

The systematic papers are all in the first volume. A paper on the tunicates of the Gulf Stream is divided into sections. In the first Dr. Brooks redescribes both solitary and chain forms of *Salpa floridana.* In the second he presents renewed studies on the muscles of *Cyclosalpa,* reiterating his opinion that the ordinary distinctions in the text-books between the Cyclomyaria and the Hemimyaria are based on erroneous observations. The third section, by Brooks and Kellner, describes a new appendicularian, *Oikopleura tortugenesis.* A parasitic protozoan is described as *Gromia appendiculariæ,* which occurred attached to the tails of the tunicates, but it clearly does not belong to the genus to which it is assigned.

Dr. H. F. Perkins has a paper on the medusæ, describing several new species, with notes on others. It is interesting that not a single male *Cassiopea* was found. Dr. E. S. Linton notes the presence of 29 species of cestode parasites of fishes, several of which, including a genus *Pediobothrium,* are supposed to be new. C. H. Edmondson describes a new variety of Flagellata from the salt water of the moat around Ft. Jefferson.

J. S. KINGSLEY

The Green Algæ of North America. By FRANK SHIPLEY COLLINS. Pp. 480, 18 plates containing 160 figures. Tufts College Studies, Vol. II., No. 3, July, 1909.

This synopsis is certain to find a ready welcome among all botanists who deal with the green algæ either in class work or with more special interests. Among the algæ there has been no group in greater need of comprehensive systematic treatment than that of the Chlorophyceæ. A descriptive work on the fresh-water forms has been especially desired since these are more numerous and more extensively studied as plant types than are the marine species. Moreover, such general accounts of the fresh-water green algæ as have heretofore been published have not treated the taxonomic side with the fulness and accuracy demanded by the difficulties of the subject. Mr. Collins must feel great satisfaction in bringing to such a fruition the results of

many years of study, and Tufts College is much to be congratulated on the way in which it has availed itself of the privilege of publication.

The work describes all the species of green algæ, exclusive of the desmids and stoneworts, known to occur in North America from Greenland to the West Indies and Mexico. The characters of each genus (with the exception of four) are illustrated by figures of at least one species. The figures, taken for the most part from authoritative sources, are well executed and will greatly assist the general student to a clear understanding of generic characters. An extensive bibliography is presented. The index is very full, including not only the species and synonyms, but also structural and descriptive terms with references to the pages in the text on which they are defined, so that the index thus serves the purpose of a glossary.

The descriptions of species are clear and concise and include a reference to the original publication of the binomial, to some good plate or figure, and when possible to some set of exsiccatæ, and conclude with records of American localities to which are added the distributions in other parts of the world. The Phycotheca Boreali-Americana of Collins, Holden and Setchell is naturally most frequently cited among the exsiccatæ as the one most accessible for American students and richest in American species. Mr. Collins as chief editor of this set of algæ has had exceptional opportunities to handle large quantities of material and probably much of his work bestowed on this exsiccata finds further and fuller expression in this book. A considerable number of American botanists will recognize that through their contributions to the Phycotheca and in other ways they have had a small share in making possible this account.

The best test of the general value of such a work as this will be its usefulness in the hands of those who are not algologists. This usefulness will depend very largely on the accuracy and at the same time the simplicity of the analytical keys. Good keys are necessarily based on the more obvious characters which are not always the most important systematically, and perhaps nowhere in works of this character can greater care be shown or is greater judgment required than in the construction of these more or less artificial guides. Genera such as *Spirogyra* with 38 species in this account, *Œdogonium* with 74 species and *Cladophora* with 53 species, illustrate the great difficulties. In some cases Mr. Collins has been able to make use of keys in certain monographs, as for example Hirn's detailed account of the Œdogoniaceæ, but for the most part they are the result of his own studies and ingenuity. His skill in this sort of work has already been shown in the admirable accounts of the Ulvaceæ, Cladophoras, etc., published at various times in *Rhodora*. The keys of this manual possess the characteristics of clearness and simplicity shown in his former work. Besides the keys to species there are also keys to the genera, families and orders, so that the synopsis is well planned in respect to all the aids that enable the reader to handle the text quickly and without confusion.

A brief account of the general system of classification is presented at the end of the introduction, but so closely associated with other matter that the attention of the reader is not brought quickly to its notice as might have been the case had the account been given a separate heading, which its importance fully justifies. Mr. Collins is not willing to follow to the extreme those arrangements which group the green algæ in large subdivisions or classes according to the structure of the reproductive elements and especially the ciliated reproductive cells, and in this respect he takes a conservative attitude. Only one group is split off from the main assemblage of the Chlorophyceæ—the Heterokontæ, a small class the forms of which are of uncertain relationship. It seems even doubtful to the reviewer whether this group (Heterokontæ) is worthy of such distinction, and there is much to be said in favor of applying the name Chlorophyceæ in its broadest signification with the full understanding that it embraces a number of distinct phyla. It is certainly hardly less broad with such divergent groups as the Conjugales, Volvocales, Ulothrichales, Siphonales,

etc., than with the Heterokontæ also included. However interesting and important are the speculations regarding the derivation of a number of lines of green algæ from a flagellate ancestry, we have not as yet such knowledge of the cytology of the reproductive cells as to give a firm foundation for systems of classification based chiefly or wholly on their structure. The groupings of the orders and families follow in the main well-known arrangements and are easily understood.

The introduction contains various matters of interest, some of which might with advantage have been grouped under headings and perhaps given more extended treatment. There are historical comments, remarks on distribution, several pages devoted to a very practical description of methods of collecting and preserving algæ, references to literature helpful to the general student, and at the end the above-mentioned account of the system of classification.

As regards the form of the book, some suggestions occur to the reviewer which are here given with the thought that later editions will be called for and also in the hope that Mr. Collins will write similar synopses of other groups of algæ. Readers would greatly appreciate page headings giving the genus on the right-hand page and the family or order on the left instead of the repeated title and publication. The figures would have been more useful as illustrations if distributed as text figures throughout the book, associated with the genera that they illustrate, rather than collected in a series of plates at the end. These changes in form and arrangement, although increasing somewhat the cost of publication, would be especially appropriate to a taxonomic work and would certainly add to the effectiveness of this remarkably clear and simple treatment.

BRADLEY M. DAVIS

Handbook for Field Geologists. By C. W. HAYES, Chief Geologist, U. S. Geological Survey. New York, John Wiley & Sons. 1909.

It seems to be a trait of human nature not to wish to buy official reports and to ignore the value of material contained in the same. Advantage has been taken of this by certain prudent publishers who reprint the more interesting and widely important government reports, finding a ready sale therefor. A number of Dr. Merrill's valuable books are practically reprints of guides to national museum collections. The book before us is of this class, and the publishers are to be thanked for introducing so valuable a work to a wider circle. This is practically a reprint of the instructions to United States field geologists, and any one who has occasion to do any practical work in geology can not fail to find much in this small book (which he can easily slip into his pocket) which will be of help to him.

This origin explains a certain dogmatic character. There is no discussion of various methods or of dubious points, but one good method is given for solving various geological problems. In no other way could so much be packed into so small a space. The style is clear and simple and there is no one better qualified to prepare such a book than the author—the Chief Geologist of the U. S. Survey.

Most of us will, I think, in reading such a book, feel as we do in reading the Bible, that we have left undone things which we ought to have done and done things which we ought not to have done. In helping one to make the necessary observations, the second part, which includes a set of schedules of the observations which should be made in studying land forms, petrology, geological structure, glacial deposits, ores and various classes of economic materials, will be of great help and suggestiveness to any one who has occasion to make inquiry in these lines. One might, perhaps, ask whether the absence of any schedule with regard to water investigations implies that the hydrographers know nothing about geology or that the geologists have little use for water! The first part includes not only suggestions for the field geologist along every line, but helps to obey these suggestions, from unit rations to mathematical formulæ. It can be most highly recommended not merely to geologists and scientific men, but, as many of the

points are applicable to any camper-out, to any one who has to do with mining or civil engineering, and it should be brought to the attention of a wide circle.

Alfred C. Lane

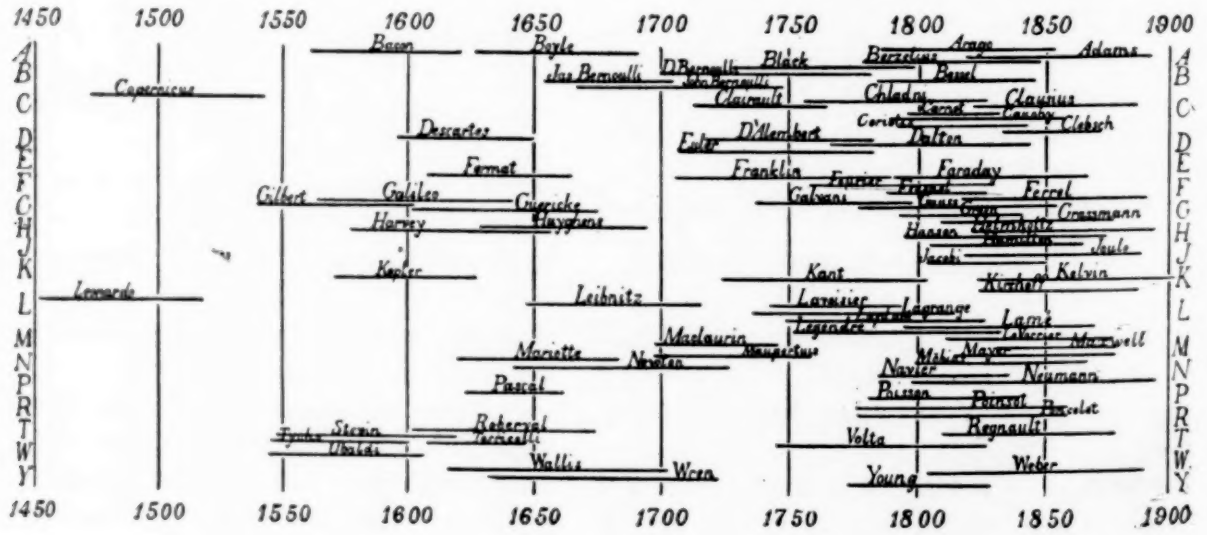
Tufts College, Mass.

SCIENTIFIC JOURNAL

The Journal of Experimental Zoology, Vol. VI., No. 4 (July, 1909), contains the following contributions: "Factors of Form Regulation in *Harenactis attenuata,*" by C. M. Child. The contraction of tissues following a wound does not appear to be an adaptive reaction to accomplish wound closure, but merely a physiological result of the injury to the tissues. The rapidity of oral restitution and to some extent the size of the parts decrease with increasing distance of the level of restitution from the original oral end, until in short proximal pieces restitution usually ceases with wound closure. "The Effects of Centrifugal Force upon the Eggs of some Chrysomelid Beetles," by R. W. Hegner. Eggs of five species of three genera of chrysomelid beetles were centrifuged at ages ranging from those freshly laid to those with well-developed blastoderms. Three strata were induced regardless of the orientation of the eggs in the centrifugal machine. In some cases eggs with their contents redistributed produced normal embryos or larvæ; in other cases a dwarf embryo resulted at the inner (light) end of the egg, not having grown around the yolk as in eggs developed normally. Female beetles after centrifuging laid eggs as usual; these with two exceptions produced normal larvæ. "Contributions to Experimental Entomology, I., *Junonia cœnia* Hübner; II., Two Cases of Anabiosis in *Actras selene* Hübner," by William Reiff. "Adaptation and Immunity of the Lower Organisms to Ethyl Alcohol," by J. Frank Daniel. The author studied the acclimatization of certain infusoria (*Stentor* and *Spirostomum*) to alcohol. Some strains of these animals showed a considerably increased resistance to alcohol after being kept for a few days in weak solutions of this substance. In other strains, having a high resistance to begin with, scarcely any increase of resistance could be caused by this means. The increase of resistance was limited to the substance used in acclimatizing the animals; when acclimatized to ethyl alcohol, they showed a decreased resistance to other chemicals.

HISTORICAL GRAPHICS

Some time ago, while preparing a paper on the history of physics, I adopted the plan of inserting the life interval of the great masters in metric cross-section paper, to the year. My only excuse for referring to the matter here is this method of reference, which proved itself surprisingly useful, both at that time and since. It consists in plotting straight line life periods chronologically, from left to right and the corresponding names alphabetically from top to bottom. Authors are thus easily found and the chronological comparison is im-



mediate. If hand charts are desirable it is expedient to reserve one chart for each of the great divisions of physics, dynamics, molecular physics, acoustics, heat, light and electricity. I attach such a chart of names bearing on the history of dynamics, in which the main coordinates only have been indicated, as the smaller divisions should be in a subordinate color. It shows, for instance, the dearth of interest in such subjects in the middle of the sixteenth century and toward the beginning of the seventeenth century, except on the part of a few men of irrepressible genius, as well as the terrific general onslaught which occurred with the beginning of the nineteenth century.

To make the chart more useful the chief date in each life should be indicated by a crossline (not shown), as for instance in case of Newton, the date of publication of the "Principia," of the "Optiks," etc.

I am writing this note with the hope that somebody will undertake the work seriously and with some degree of completeness. It seems to me clear that available wall diagrams of this kind would not only enliven the work of the teacher of a forbiddingly difficult subject, but would suggest the vast array of profound investigation to which the physics of the present day owes its assurance and trenchancy.

CARL BARUS

BROWN UNIVERSITY,
PROVIDENCE, R. I.

SPECIAL ARTICLES

ON THE OCCURRENCE OF THE LITTORAL BARNACLE CHTHAMALUS STELLATUS (POLI) AT WOODS HOLE, MASS.

To one acquainted with the world-wide distribution of this barnacle, it would seem rather superfluous to call attention to its presence in any specific locality. It is a rather curious fact, however, that this abundant and almost cosmopolitan species seems to have hitherto escaped the notice of those who have listed the New England fauna. Neither Gould ("Invertebrate Animals of Massachusetts," 1840), nor Verrill ("Invertebrate Animals of Vineyard Sound," 1873), nor Miss Rathbun ("Fauna of New England: List of the Crustacea," 1905) have included this barnacle among the New England species, though certain far less common forms are listed by each of these writers; and the only reference of which I am aware to its occurrence on the Atlantic coast of North America is contained in Darwin's "Monograph of the Cirripedia," in which he refers to "some specimens attached to oysters sent to me by Professor Agassiz, from Charlestown" (p. 457). It would seem more than possible that *Charleston* is here intended, for on a previous page (456), Darwin includes "Southern United States (Charlestown)" among the localities from which *Chthamalus stellatus* is recorded. I am informed by Miss Rathbun that no specimens of this barnacle from New England are known to be contained in the U. S. National Museum collections. Through the kindness of the curator, Mr. C. W. Johnson, I have examined specimens of this species (varieties *communis* and *fragilis*), contained in the collections of the Boston Society of Natural History. The locality has not been recorded, however, and there is nothing to indicate whether or not the specimens came from New England waters.

The author was first led to look for this species at Woods Hole during the present summer, when he found it to occur in considerable numbers on Penzance Point, along the shore of Woods Hole passage. Further search has revealed its presence on the piles of piers at Woods Hole, New Bedford and Vineyard Haven, and on rocks at Nobska Point, Nonamesset Island, and the shore of Buzzards Bay near Woods Hole. It is probable, indeed, that its local distribution is very general. At the last named point this species seems to be particularly abundant. It extends considerably higher up on the boulders than does *Balanus balanoides*, with which, however, it is associated at a lower level. It thus occurs at points which must be uncovered by the tide for the greater part of the time. In local waters, so far as I have seen, *Chthamalus* never grows in such dense clusters as does *Balanus balanoides*, and indeed it appears unable to compete very successfully with the latter in its proper zone.

Like its associate, it is a strictly littoral form and probably does not extend below tidal limits.

Chthamalus stellatus was first described by Poli in 1795 from specimens taken on the coast of Sicily. It is so abundant on some parts of the French coast that Pruvot[1] recognizes a "Chthamalus zone" as one subdivision of the littoral zone. The same species is common upon the southern coast of England, being "in parts, even more numerous than the *Balanus balanoides*," according to Darwin. The other localities listed by Darwin include points as remote from one another as Ireland, China, Oregon, the Red Sea and the Rio Plata. Gruvel[2] likewise includes Iceland and Patagonia, so that the species may truly be regarded as cosmopolitan.

It is surely difficult to explain how this barnacle has been so long overlooked upon our own Atlantic shores. It is hard to believe that the present species has been habitually confused with *Balanus balanoides* by the long succession of field naturalists and systematic zoologists who have exploited the shores of New England for over a century. These men erred rather in the direction of discovering too many new species than in ignoring well-established ones. An alternative explanation is that *Chthamalus* has only recently invaded New England waters, just as we know that various other species have done within recent years. The mollusk *Litorina litorea* and the actinian *Sagartia luciæ* are doubtless the most striking local examples of this phenomenon, though we have strong evidence for a few other cases. From the comparatively small size of the local examples, and their unworn appearance, as compared with the older specimens of *Balanus balanoides*, the writer was at first tempted to think that the immigration had only reached local waters during the present season. He has, however, found a few specimens on stones which had been collected three years ago.

The local examples, in large part at least, seem to belong to the variety "*fragilis*" of Darwin, as did the specimens received by the latter author from "Charlestown" (=Charleston?). A characteristic of this variety is the smooth, delicate appearance of the valves, referred to above as distinguishing local specimens. At Woods Hole, I have found few having the rugosity, the weathered aspect, or even the whiteness of *Balanus balanoides*. Our local representatives of the species are so much darker in color and so much smoother in appearance than the associated *Balanus* as to be plainly distinguishable from the latter, even at considerable distance. Thus the confusion of the two, said to have been commonly made by English collectors, seems incredible here.[3] The largest specimens which I have seen have not exceeded 10 mm. in diameter at the base.

Not being a specialist in the difficult group of Cirripedia, I grant freely the possibility that I have made an error in my *specific* determination. The species in question is, however, a *Chthamalus* in any case, and *C. stellatus* is the only one hitherto listed from the North Atlantic. The interest of its discovery in local waters would not be lessened, but rather increased, if it were shown that we had to do with another member of the genus.

F. B. Sumner

[1] *Archiv de Zoologie Experimentale et Générale*, Tome V., 1897.

[2] "Monographie des Cirrhipèdes," p. 201.

[3] Of course the two genera are distinguished by much more fundamental characters than mere appearance.

THE SEVENTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY

The Seventh International Congress of Applied Chemistry convened in the Great Albert Hall, London, on May 27 last under the patronage of the King of England.

The vice-patron, the Prince of Wales, accompanied by the Princess, presided. In opening the congress he spoke of the pleasure experienced by His Royal Highness, King Edward VII., in having the congress meet in London and his own appreciation of the significance of the passing of the "rule-of-thumb" period in modern civilization, the close relationship between science and commerce and the important bearing such conferences had in promoting the peace of the world. His remarks were greeted with cheers from the diplo-

matic representatives of the various governments at the Court of St. James, who formed a picturesque background for the royal patrons, and the hundreds of distinguished men of chemical science gathered around and in front from more than twenty of the civilized nations of the world.

Sir Henry Roscoe, the honorary president, offered an English welcome to his colleagues assembled from all parts of the world and thanked the royal patrons for the felicitous manner in which they had inaugurated the conference.

Sir William Ramsay, the acting president, welcomed the foreign representatives in the official languages of the congress, English, French, German and Italian. He emphasized the close relationship between pure and applied chemistry as observed upon the Continent, and the especial need of a fuller realization of the fact in Great Britain and America. He complimented the Italian organization committee of the sixth congress for applying the surplus of the funds to defraying the expenses of a band of Italian students in attendance on the London congress. He concluded his remarks by quoting the motto, "Philadelphia Maneto!"—"Let brotherly love continue!"

These addresses of welcome were responded to significantly in complimentary terms in the following order:

Speaking for America Dr. H. W. Wiley (in "Ustatian") called attention to the fact that, but for what chemistry had done, teeming millions of our globe would be unclad and unfed; the principles of prophylaxis in medical science were mainly due to the services of chemistry; sanitation is applied chemistry; pure food, pure air, pure drink meant pure minds and bodies, prolongation of life and more effective endeavor; and more important than all, chemistry had elevated the morals of man by detecting and exposing fraud.

Professor Armand Gautier (in French) called attention to the rivalry—always friendly and not hostile—of the men of science in France and England, and that in spite of past differences due to political causes, the mutual appreciation of the men of science in the two countries had annihilated those differences and brought them in closer communion than possible through any formal treaties.

Professor Dr. O. N. Witt (in German) anticipated that the present congress would mark a further "advance in the path of international discussion and understanding trodden by our science" and every country was interested in some degree in the subjects of the congress.

Professor E. Patrnò (in Italian) referring to the enthusiasm shown in Rome to accept the invitation to hold the seventh congress in that country which produced Boyle, Black, Cavendish, Priestley, Wollaston, Dalton, Davy, Faraday and Graham. "Even in the busy, noisy, bewildering rush of London life men of science yet know how to find the tranquility and quiet necessary for the investigation and discussion of the most abstruse problems of philosophy and science."

Professor Arrhenius (in English), speaking for the other foreign countries, referred to England as the classical land of applied chemistry and of the application of improved hygiene in London so that it had the lowest death rate among the large cities of the world.

Sir Frederick Bridge, organist to Westminster Abbey, gave a preliminary organ recital and the national anthem was played and sung as the formal inaugural meeting concluded.

The congress was divided into seventeen sections. The titles of the papers presented are of interest, but are omitted on account of lack of space.

It may be remarked here that more or less confusion resulted in some instances when joint meetings of sections were announced. This should be avoided. It also appears to your representative that four days are too few for the best results from such a large congress. It was quite impossible to determine the exact hour at which many important papers were to be presented and only too frequently extremely interesting subjects, more or less allied, were under discussion in different sections.

The social features of the congress were undoubtedly of equal if not greater importance than the papers presented. The English homes were hospitably wide open. Numerous delightful private dinner parties, followed by more numerous receptions, charming garden parties such as only the English know how to give, gave every chance for intimate exchange of ideas. Of the private garden parties reference can only be made to one given by Dr. and Mrs. Ludwig Mond and Mr. Robert Mond on Sunday afternoon, May 30, to which 1,700 tickets were issued. These included the entire Italian delegation, which took advantage of the occasion to present Dr. Mond with a noble bronze in appreciation of his numerous gifts to the art and science of Rome. The garden party was not only complete in the most elaborate detail for the

varied entertainment on a suitable scale for the large company, but was arranged to display some of the exquisite ancient art recovered in Egyptian excavations, the expenses of which were borne by the Mond family. In the adjoining home of Mr. Robert Mond there was perhaps the best exhibition of colored photographs, many taken by him, in any private collection. One also saw there pure nickel and cobalt in various forms, and the various carbonyls of nickel, iron, cobalt and palladium, some shown the first time.

The American Ambassador, the Hon. Whitelaw Reid, gave a dinner to the American commissioners on Whit-Monday evening at Dorchester House, followed by a reception attended by over 1,000 members. Dr. Messel also entertained the American members at tea at the White Hart Hotel, after the visit to Windsor Castle, Wednesday afternoon.

The following general receptions were held:

May 26—Reception by the Lord Mayor and Corporation of the City of London at the Guildhall.

May 27—Reception at the Foreign Office.

May 29—Reception by the London Section of the Society of Chemical Industry at the University of London.

June 1—Reception at the Natural History Museum.

The London ladies' committee did everything for the comfort and pleasure of the visiting ladies. A charming garden party was given by them at the Botanic Gardens, to which the men were also invited. The season was just right for a magnificent display of rhododendrons and laurel.

On Friday evening, May 28, a joint banquet of the congress and the Society of Chemical Industry, which met in annual session the day before the congress convened, was held in the Crystal Palace. Sir William Ramsay, supported by Professor Raphael Meldola, retiring president of the Society of Chemical Industry, presided over the 1,500 ladies and gentlemen present.

The president proposed the toasts, "The King," "Foreign Rulers" and "Our Friends from Abroad." With the last he coupled the names of Nichols, Brauner, Gautier, von Böttinger, Piutti and Hoogewerff.[1]

Dr. Nichols, replying for America, said that he resided in New York, spent his summers in Canada, and was a representative of the Mexican government. As a commissioner of the United States government and the official representative of the American Chemical Society he thanked the hosts for their wonderful hospitality. While the chemist owed much to the world, the world owed much to the chemist and it would owe more before it owed less. In the great problems of the future just about to commence, the building up rather than the pulling down of the universe, the chemists of America would do their share.

Professor Bohnslav Brauner replied in English for the Austrian Imperial Monarchy. Thirty years ago he had studied under the distinguished honorary president, Sir Henry Roscoe, when he was preaching a crusade against the domination of the "rule of thumb" and he rejoiced that the highest in the land now declared that the "rule of thumb" was dead, and the Congress of Applied Chemistry was the one to give it its *coup de grâce*.

Professor Armand Gautier, speaking in French, said that the *entente cordiale* existing between the English and French chemists dated back to the period when Priestley went to Paris, when Lavoisier called Black his master and when Napoleon allowed Humphry Davy to travel in France with his assistant Faraday at a time when every Englishman was forbidden French soil.

Dr. von Böttinger trusted, in German and English, that the congress would not only further the work of science but the amiability and friendship among all nations.

After Professor Piutti had said a few words for Italy, Professor Hoogewerf, of Holland, spoke for the other nations, whose representatives were mentioned later in alphabetical order beginning with Argentina and ending with Turkey. Dr. Hoogewerff referred to the founding of the theory of ions by Faraday, Ramsay's discovery of the noble gases and the recent apparent demonstration of the disintegration of what was formerly regarded indivisible. The sulphuric acid industry had its birth not far from London, the first city to be lighted by coal gas, and the Scotchman, Young, laid the foundation of the shale industry and Perkin began the coal-tar industry.

An elaborate display of fireworks in the grounds of the palace closed the proceedings. Special trains conveyed all to and from the city.

On Saturday morning, May 29, the King rereceived a deputation from the congress accompanied by Sir Henry Roscoe, Sir William Ramsay and Mr. William Macnab (honorary general secretary). The following constituted the deputation: Dr. W. H. Nichols (America), K. K. Regier-

[1] The writer is indebted to the official stenographic reports of the Society of Chemical Industry for notes of these speeches.

ungsrat Fred. Strohmer (Austria), Dr. Francis Sachs (Belgium), Mr. Ou Kouanze (China), Professor Léon Lindet (France), Geh. Regierungsrat Professor Dr. Otto N. Witt (Germany), Professor Emanuel Paternò (Italy), Professor Kuhara (Japan), Dr. S. Hoogewerff (Netherlands), N. Tavildaroff (Russia), Professor Pinerùa y Alvarez (Spain), Professor Arrhenius (Sweden) and M. F. Reverdin (Switzerland).

Four general lectures were arranged in Great Hall of the Imperial Institute. Two short ones on Friday, May 28, were given by Professors Haller and Paternò. The writer was unable to attend these and has not secured either the titles or accounts of the lectures, hence he regrets he can not give abstracts.

On Monday, May 31, Professor Witt gave an admirable address in perfect English on "Evolution in Applied Chemistry." A complete appreciation of the charming lecture requires its perusal in the Transactions, which should appear within the year.

He said that evolution was no longer a working hypothesis in natural science; it had become a way of thinking. One of the best combinations of empiricism and theory was the examination of old empirical industrial processes by the methods and in the light of modern science. Much valuable information had been thus obtained, but what an immense amount of information still remained lying dormant in unread Egyptian papyri and palimpsests! There is a great treasure of industrial experience of the eastern nations, much of which is equal to or superior to that of the western peoples. We know so little about them, and what we do know is from accounts of travelers, who were not chemists. Industries which have benefited by secrets derived from the East are cotton-dyeing, calico-printing, indigo-dyeing and porcelain. A duty of such international congresses is to watch over the intellectual wealth of the past and to collect it before it disappears forever by the adoption of more rapid western methods.

The biological analogy of the influence of environment on the development of industries was dwelt upon. Whenever an industry left its native country, or often even when it moved from one part of a country to another, it had to be remodeled to suit the different conditions. The history of applied chemistry is filled with instances in which the survival of the fittest meant nothing more nor less than a victory for economy. As a whole, progressive economy was not so dependent upon improvement in apparatus as upon the simplification of the fundamental chemical reactions—in other words, upon better utilization of the energy involved.

Only recently have we begun to have a conscience for fuel. The quantity of fuel required to produce the energy for any industrial process was dependent upon the manner in which it was required to do its work. Once smoke was regarded as an evil, then a nuisance, now it is known as a waste, and none had better cause to wage war against it than he who produced it. A smoking chimney is a thief, not only because it carries visible unburned carbon into the atmosphere, but in a majority of cases invisible carbon monoxide and methane, with all the latent energy they contained. Regenerative gas-heating not only prevents smoke, but is a powerful means of economizing heat. The saving of national wealth effected by it might amount to a sum sufficient to pay the aggregate national debts of all the civilized nations. Uncivilized nations were blessed with neither national debts nor heat-regenerating appliances.

Professor Witt closed his lecture by reference to symbiosis and aggregation. As plants and animals of totally different nature and organization combine for joint life and activity with the object of self-protection in the great struggle for existence, so the various forms of chemical industry were essentially dependent upon each other for success and progress. The more varied and numerous the factories, in spite of apparent competition, the more they prospered. Congresses of chemists, such as the one in session in London, represent a modern form of human symbiotic effort. "They proclaimed the great truth that science knew no boundaries and frontiers, that it was the joint property of all humanity, and that its adherents were ready to flock together from all parts of the world for mutual help and progress."

On Tuesday afternoon, June 1, Sir Boverton Redwood gave a lecture upon "Liquid Fuel," which was rich in matter, suggestive, splendidly illustrated and excellently presented.

Upon the invention of the steam engine the days of the windmill and old-time water wheel seemed to be numbered; sailing ships had given way to mechanically-driven vessels; gas-explosion engines and electric power seemed to be driving out the horse, without whose aid at one time it was thought that no civilized nation could exist. In some directions there was a disposition to revert to the old order of things, as shown in the utilization of water powers with improved appli-

ances; inventors were not without hope of utilizing the ocean tides; in fact, several installations do exist where this is done. Some imaginative people held out in the indefinite hope of our securing some unknown form of energy, but dependence upon such an assumption was undoubtedly gratuitous folly. It was therefore of the utmost importance that the strictest economy be practised in the expenditure of our fuel capital and thus postpone a fuel famine, which is of the gravest importance to a country situated as England is. The principal fuels, in addition to wood, coal and petroleum, including natural gas and products obtained from destructive distillation of bituminous shales, are lignite, peat and alcohol.

Reference was made to President Roosevelt's important call for an international conference on the conservation of natural resources that an inventory of the world's supply might be prepared. Attention was directed in this connection to the report of Dr. D. T. Day, petroleum statistician of the U. S. Geological Survey, who has given data to show that at the present rate of increase America's supply of petroleum will be exhausted in 1935, and if the present output were maintained the supply would last only ninety years.

A review of the sources, geological and geographical, of petroleum showed that its distribution is wide, but the world is largely dependent at present upon the United States and Russia. The output could be greatly increased, because up to the present those deposits only which yielded oil suitable for conversion by fractional distillation into lamp oil and the ordinary commercial products of the refinery had been utilized. Now with the more general development of the use of oil for fuels, the heavy forms of oil have become marketable products. In this connection attention was directed to the ease now experienced in pumping the most viscous oils through pipes, which was formerly regarded impossible, by rifling the pipes and lubricating them with a current of water, which travels simultaneously through the grooves.

In this connection it was stated that for most purposes on land the internal combustion engine would before long replace the steam engine, at least for moderate powers. The steam engine furnishes only about 12 per cent. of the energy of the fuel in the form of work, whereas the former engine yields 25 per cent. The Diesel engine even yields 37 per cent. However, according to Sir William White, the introduction of the turbine engine has given the steam engine a new and probably lengthy lease of life.

Liquid fuel possesses the advantages and coal most of the disadvantages. The thermal efficiency, talking in terms of evaporating power for steam, for a pound of oil and a pound of good steam coal, is 17 to 10. On account of increased radius of action for vessels the British Admiralty placed the figures at 18 to 10. Great economy is had in the ready flexibility in the use of oil. In the case of coal, a thick bed of incandescent fuel must be ready and considerable time is necessary to bring this into a condition of active combustion. Clinkers must be removed, labor is involved, and cold air rushes in, which is detrimental to the boiler, besides being wasteful of fuel. In regard to oil, the fueling of a vessel, for example, at sea is a simple matter with a flexible pipe-line. Furthermore, the combustion can be controlled with precision, quickly brought to highest fuel efficiency upon sudden or unusual demand, or cut off entirely. Stoking expenses are cut, and, in the case of locomotives, the stoker can give intelligent assistance to the engine-driver, which is not only of educational value, but a valuable safeguard as well. Attention was directed to the enormous increase in the consumption of oil on the railways in the United States. In 1907 it amounted to 18,885,691 barrels; the length of line operated was 13,593 miles and total length of line covered by oil-burning locomotives 74,197,144 miles or an average of 3,935 miles per barrel of oil consumed. Many large power plants also consume oil fuel in America.

A most spectacular experiment, in the shape of a burning petroleum fountain, was performed as an awe-inspiring illustration of the combustion of liquid fuel, to call attention to the remarkable incident which took place a year ago in one of the Mexican oil fields. A well, 1,824 feet deep, was sunk in a petroliferous formation charged with oil under tremendous pressure. In less than twenty minutes after, the formation was unexpectedly penetrated, the ground around the well began to tremble and fissures, some 250 feet long, appeared. One of these extended under the boiler and, although the fire had been drawn, the gas was ignited. The well burned fifty-eight days, consuming 3,000,000 barrels (estimated) of oil. The flame reached a height of 1,500 feet and at the broadest part was nearly 500 feet in diameter, and was so bright that a newspaper could be read eleven miles away by its light. In addition to the

escaping oil and gas, it was estimated that 1,500,000 barrels of water were discharged per day, and with the liquid about 2,000,000 tons of solid matter, so that ultimately a crater of 117,600 square meters was formed. The fire was eventually extinguished by pumping sand into the crater with centrifugal pumps.

Words of warning were given in regard to the fear expressed by some as to overproduction of oil; also he wished to dispel any illusions as to the displacement of coal by oil, for the latter constituted but a very small percentage of the fuel used, or that would become available; although no one could say how much petroleum was yet to become available, there was not much likelihood that it could ever revolutionize the fuel industry.

In connection with this address it might be mentioned that series of papers were presented before the metallurgy, organic and law sections upon fuel and methods for determining its value, coal-dust explosions, gas-producers, sources of oils, as shale oil, uses of by-products, and the smoke problem. The International Congress on Petroleum met for two days previous to the congress.

The special lecture which attracted most attention was undoubtedly that of Professor A. Bernthsen on "The Utilization of Atmospheric Nitrogen, Particularly for the Manufacture of Air-saltpeter," given in Professor Armstrong's lecture theater. Having directed attention to the importance of soluble nitrogen compounds for fertilizing purposes, tracing the history of our knowledge of the value of nitrogen in plant and animal life, the lecturer said that of the 2,000,000 tons of Chili saltpeter exported annually Germany took one third. Crookes prophesied that the supply of saltpeter would be exhausted before many years had passed, and by 1935 there would be such a demand for wheat that, even if all the ground now available were planted, the yield per acre must be increased from 12.7 to 20 bushels in order to supply it. Twelve million tons of saltpeter would be required per annum in addition to the 1,750,000 now being used. Even if Chili still had 50,000,000 tons of saltpeter in 1935, the four following years would exhaust it.

The nitrogen of the air amounts to about four billion tons. On the basis of the present annual consumption, allowing no replacement, the air contains enough nitrogen to provide fourteen thousand million years' supply of saltpeter. The world's demand increases by about 100,000 tons per annum. Shortly by the process described, and demonstrated on a large scale by the lecturer, that amount would be placed upon the market every year.

The comparative value of ammonium, nitrate and nitrite compounds was dealt with in some detail and reference made to the sources of these classes of compounds.

The different methods employed in the fixation of atmospheric nitrogen may be divided into three groups. First, direct formation of ammonia from its elements, both of which have to be isolated for the purpose. Second, the formation of metallic nitrides and cyanogen compounds, which are subsequently decomposed into ammonia compounds. And third, those methods which aim at the direct oxidation of atmospheric nitrogen to nitrites or nitrates. These methods were discussed from scientific, practical and economic points of view, attention being given especially to the cyanides, nitrolime, "Stickstoffalk."

In the combustion of nitrogen in oxygen, there is an equilibrium for each temperature between the nitric oxide produced and the nitrogen and oxygen, hence the amount of nitric oxide produced at any temperature can not exceed that corresponding to the state of equilibrium for the particular temperature. The following figures give the percentage produced: at 2,200° C. the gases contain 1 per cent. nitric oxide, at 2,571° C. 2 per cent., at 2,854° C. 3 per cent. and at 3,327° C. 5 per cent. Therefore the air must be heated to as high a temperature as possible and the products cooled as rapidly as possible to reduce the decomposition of the nitric oxide to free nitrogen and oxygen to a minimum.

The numerous methods proposed for accomplishing this, especially that of Cavendish, who in 1785 said it could be accomplished by electric spark discharges, were discussed. Particular attention was given to the modern practical processes of Bradley and Lovejoy, Birkeland and Eyde. The original papers, or this lecture, which may be had in printed form from the Badische Anilin- und Soda-Fabrik, should be consulted for the details. The process of his company, as worked out by Schönherr and Engineer Hessberger in 1905, and claimed to be superior to those of Birkeland and Eyde, was then described. This dispenses with magnets used for creating a strong field, which spreads out the flame into the shape of a flat, more or less circular, disc. Schönherr produces his arc inside an iron tube of compara-

tively small diameter, the air passing through the tube and thus coming into contact with the arc. The arc tube contains an insulated electrode at one end, which can serve itself as the second electrode. "The arc, at its formation, springs from the insulated electrode to an adjacent part of the arc tube which is only a few millimeters away, but the air, which is passing through the tube, being preferably introduced with a tangential or rotary motion, immediately carries the end of the arc along the wall of the tube, so that it either enters the tube at a considerable distance from the electrode, or it ends on a special electrode placed for the purpose, say, at the other end of the arc tube."

There are some modifications, which need not be referred to here. A column of arc flame of very high temperature is obtained burning quietly in the axis of the tube and surrounded by air, which is being passed through the tube. Large quantities of electrical energy may be driven easily and safely through a comparatively small tube. The experimental furnaces at Christianssand are fed with about 600 H.P. at 2,400 volts. The larger furnaces of 1,000 H.P. require 40,000 cubic feet of air per hour and have arcs over twenty feet long.

The nitrogen monoxide produced is readily changed to nitrogen dioxid with oxygen and is absorbed by quicklime in the form of briquettes.

Cheap water power is necessary. A factory is in process of construction at Notodden, Norway, to consume 30,000 H.P. and another, with ten turbines, to develop 140,000 H.P. at Telemarken on the Rjukan.

It is of sentimental, but essentially practical, interest that these processes do not participate in the destruction of valuable coal deposits in obtaining the necessary energy, but use "white coal," which with the constant aid of nature, through the principles of evaporation and condensation, may be used over and over again.

As may be seen from the list of papers presented, the subject of nitrogen availability was one to which great attention was given. In looking over the titles of the papers presented it is suggested that the reader later note the formation of international commissions which are to deal with some most important problems. The members of all the various commissions have not as yet been selected.

On Thursday, May 27, many of the sections met for organization.

Sections I. and VII. held a joint meeting at eleven o'clock, when Martin Ullmann presented reports of the International Commission for the Analysis of Artificial Fertilizers and Feeding Stuffs. The following questions were dealt with:

1. "Ueber die Analyse der Rohphosphate."

2. "International Regelung des Kali-Koeffizienten."

3. "Die Methode König zur Bestimmung der Holz-faser."

4. "Ueber Methoden für die Analyse von Stoffen, dienend zur Bekämpfung der Krankheiten des Weins."

Heinrich Fresenius presented the report "VI. Subkommission der Internationale Analysenkommission."

Section II. The president, Ludwig Mond, delivered his address on "The Metallic Carbonyls."

Section III. Sir Hugh Bell, the president, delivered his address.

Whit-Sunday, May 30, was given over to rest by many, sightseeing by others and numerous parties upon the Thames, which was seen in its best splendor, yet the 300 seats reserved each at St. Paul's Cathedral and Westminster Cathedral for members were occupied, some of whom later attended the garden parties of Dr. and Mrs. Mond and Mr. Robert Mond at their homes, and Dr. and Mrs. Thorne at Kew Gardens.

It is interesting to note that sermons were preached from these historic pulpits along the lines of the "Newer Revelation" harmonizing modern scriptural interpretation with the most advanced scientific conceptions. What a jolly lot of excommunications there might have resulted from these eloquent sermons a century ago!

Excursions were arranged as follows:

Friday, May 28—Laboratories Royal Army Medical College, Millbuth.

Saturday, May 29—Excursion to Rothamsted; London County Council Sewage Works; Hampton Urban District Council Sewage Works; Metropolitan Water Board Water Works; London County Council School of Photo-engraving and Lithography; The Photographic Department of the Polytechnic.

Tuesday, June 1—National Physical Laboratory; Laboratories Metropolitan Water Board.

Wednesday, June 2—Biscuit Factory of Peek, Frean & Co. at Bermondsey; Laboratories of the Inland Revenue Department; visit to Windsor Castle by permission of His Majesty the King. Special trains transported a large number to and fro.

Special resolutions were adopted in several sections. In Section I. (Analytical Chemistry) a general definition for the yield of volatile matter in fuels was proposed and carried. "The percentage which is found by subtracting from one hundred the yield of coke obtained, by the method of the American Committee on Coal Analysis (*Journ. Amer. Chem. Soc.*, 21, p. 1122), from 1 gram of fuel in a bright platinum crucible. The yield must always be calculated upon the pure combustible matter."

In Sections IIIa. and IIIb. (Metallurgy and Explosives) it was *Resolved*, "That it is desirable that the International Commission appointed in Rome in 1906 to consider the standardization of tests for the stability of explosives be reappointed till the next congress."

In Section V. (Sugar) a committee, composed of Messrs. Andrlik, Claassen, Herles, Herzfeld, Pellet, Sachs, Saillard, Strohmer and Villavecchia, was elected to carry out the provisions of a resolution for appointing a "committee for standardizing the concentrations of sugar liquors intended for analysis."

A committee was appointed, consisting of Messrs. Dupont, H. Pellet, Fischmann, Sachs, C. Borgrino and Saillard, to take steps towards furthering the movement for obtaining a reduction of the taxes on sugar advocated by MM. Dupont and Fischmann.

A committee, consisting of Messrs. Pellet, Sachs, Strohmer, Herles, Saillard and Herzfeld, was appointed for drawing up the text of a proposition to be put before the International Commission for Unification of Sugar Analyses for making the aqueous method of Pellet for the analysis of beet the standard one.

The International Commission for the Unification of Methods of Sugar Analysis adopted the following: "That a standard table at a temperature of 20° C. be officially adopted by the commission, and that this table be based on the official German table; and, further, that other tables at different temperatures (such as 15, 17½, 20, etc.) be calculated from the standard one, as also one according to the Mohr system at 20°/20°.

In Section VIIIc. (Bromatology) the International Commission on the Unification of Analytical Methods has issued the following account of their proceedings:

La Commission s'est réunie les vendredi 28, samedi 29 et lundi 31 mai a 9 h.m., sous la présidence de M. André.

Elle a arrêté un réglément d'ordre intérieur; puis elle a examiné et approuvé un projet de rapport sur son organisation et ses travaux.

Elle s'est ensuite occupée des rapports sur l'unification des méthodes d'analyse préparés par MM. André, von Buchka, Chapman, Cribb, Lavalle, Schoepp, Mastbaum, Piutti, Vandevelde, Wauters, Wiley (Voir Séance du samedi 29 de la section de bromatologie).

Enfin elle a procedé au recrutement de quelques membres nouveaux et la constitution de son bureau. M. von Buchka a été élu président; MM. Armand Gautier, Thorpe, Piutti, Schaffer, Wauters, Wiley, Wysman, vice-président; M. Vandevelde, sécretaire général.

After a lengthy discussion, in which many took part, this resolution was carried: "That brandy is a product of the distillation of wine, and the term is synonymous with eau de vie de vin."

In Section IX. (Photo-chemistry) R. Namias and L. P. Clerc, by request of the permanent committee of the International Congresses of Photography, laid before the section the provisional program of the fifth International Congress of Photography to be held at Brussels in July, 1910, during the International Exhibition.

R. Namias, in the name of the Societa Fotografica Italiana, of Florence, presented to the section an album containing a large number of photogravures of Messina and Reggio representing the effects of the recent lamentable disaster. These prints constitute the greatest known work of photographic record. The text is printed in four languages, and the publication is on behalf of the institution established to assist destitute orphans.

In Section X (Electro- and Physical Chemistry) it was proposed and carried that a committee composed of the following members—Messrs. Abegg, Bancroft, Bodenstein, Bruni, Carrara, Dutoit, Findlay, Kistiakowski, Lewis, Lunden, Marie, Mourels, Rothmund, Urbain, Walden and Wilsmore—be appointed to deal with the values of physical-chemical constants.

A committee (not yet announced) to deal with the general question of thermochemical notation was also authorized.

The official closing general meeting occurred in the Great Hall of the Imperial Institute, Sir William Ramsay presiding, supported by Sir Henry Roscoe, and presidents of previous congresses present, Professors Witt, Lindet, Gautier and Paternò.

It was announced that 3,000 members had joined the congress with 650 ladies.

Reports of the several sections were presented with the resolutions recommended for adoption. All were approved except those bearing upon certain patent legislation. These were postponed to the next congress.

The following resolutions from the sections were put to the meeting:

Section I.—

1. "En vue d'unifier les méthodes d'analyse et de récherche dans l'essai des essences de produits résineux, le congrès international de chimie appliquée émet le vœu de voir s'établir par les soins de la Section I. un tableau définissant les bases à utiliser dans l'estimation la pureté des sousdits produits et dont l'usage serait fortement recommandé a tous les analystes."

2. "The institution of official methods for agricultural analyses is undesirable, unless subject to periodical revision."

3. "The Seventh International Congress of Applied Chemistry considers that it is desirable to adopt uniform principles in connection with the application of reference tests, and is of opinion that the proposals made by Professor T. W. Fresenius constitute a suitable basis for these principles."

Section IVa. bis. "That the section in future congresses be a separate and independent section entitled Biochemistry, including pharmacology."

Section VIb. "That this meeting, being in sympathy with the suggestion of Professor Lindner to form a central bureau for fermentation organisms, hereby empowers him to write to the council of the Institute of Brewing (London) as to how such a project could be carried into effect."

Section VIIIa.

1. "That the congress requests the various governments to nominate a commission to make researches in collaboration with manufacturers on materials used in the ceramic arts, to encourage the use of substances not containing lead; to restrain the use of lead materials, and to conduct further researches with regard to protective materials for the hygienic use of those engaged in the ceramic industries."

Reports were received from the International Commission for the Unification of Analytical Methods, which body held short sessions on the mornings of May 29 and 31 and June 1, between 9 and 10 A.M. At these certain resolutions were passed, which were communicated verbatim to the general meeting on June 2.

On the occasion of the discussion on brandy a resolution was passed embodying a definition of the word "brandy."

2. In conjunction with Sections IIIa. and XI. "The congress is requested to appoint a committee to impress upon the governments of each country represented at the congress the importance of adopting a uniform law throughout their respective territories regarding the emission of noxious fumes from chemical and metallurgical works and of black smoke from works and factories. The section believes that the abatement of atmospheric pollution will be most rapidly secured by placing the control of all such gaseous emanations in the hands of fully qualified inspectors capable of giving the necessary technical advice to manufacturers. It records its conviction that the dispersal of the pall of smoke covering certain industrial districts in England and elsewhere will be accompanied by enormous benefit to the inhabitants, and will prove an ultimate gain to the manufacturer."

Section VIIIb. "That this meeting of the Pharmaceutical Chemistry Section of the International Congress of Applied Chemistry having received and discussed communications by Messrs. Squire and Caines and MacEwan and Forrester, resolves that it is desirable that an international enquiry should be instituted with a view to securing: (1) greater uniformity in the commercial supplies of potent drugs and the means for determining the same, and (2) approximation in the pharmacopœias of the world to common standards of activity. With a view to advancing these objects this meeting further recommends that the following provisional committee be appointed to enquire and report on the subject to the next meeting of the congress: Messrs. P. W. Squire and F. Ransom (Great Britain), Professors H. Thoms and E. Schmidt (Germany), Professor E. Bourquelot and M. Leger (France), Professors Piutti and Guareschi (Italy), Professors Remington and Rusby (United States), with P. MacEwan (Great Britain and United States) and G. P. Forrester (European Continent) as secretaries. This meeting recommends that the provisional committee shall have power to invite as members with equal rights persons who have interested themselves in this subject, and further that this resolution shall be conveyed to the governments and pharmacopœial authorities who were represented at the Brussels Conference (1902) on the unification of potent remedies."

Section XI.—

1. "That the committees of the various countries party to the International Convention for the Protection of Industrial Property be requested to consider the desirability of adopting the following provision: 'The manufacture in one country of the union protects the patentee against the revocation of his patent in all countries of the union.'"

2. "The section recommends the question raised by M. de Laire's paper on 'The International Patent' to the attention of the International Association for the Protection of Industrial Property and to the national committees for study with a view to future congresses."

3. "That international committees be appointed representative of all the nations party to the Congress to consider and draft proposals for joint international patent and trade mark legislation, with a view to international uniformity, such proposals to be laid before the congress of 1912 for discussion and further action."

4. "That the congress deprecates any patent legislation limiting the patentability of pharmaceutical products."

5. "To commit the question of international acknowledgment of the right of prior use within the states adhering to the International Convention to the International Association for the Protection of Industrial Property for further consideration."

6. "That the congress expresses the wish that there should be created an 'international depôt de plis cachetes.'"

7. "That it is necessary that a fancy name designating a medicinal compound of definite composition should be protected as a trade mark as securely as such a name applied to a secret remedy or a remedy of indefinite composition."

8. "It is desirable that all manufacturing countries, notably Germany, Great Britain and the United States, adhere to the Madrid Convention concerning international trade-mark registration, and that this arrangement should be raised at the next conference in the sense that: (*a*) registration of a trade mark at the Berne Bureau should only have a formal effect; (*b*) that the deposit at the Berne Bureau be independent of registration in the country of origin."

9. "That an international commission be appointed for the study of technical rules defining requisites, to which should correspond the principal chemical products commercially known as commercial products."

10. "That the work of this commission should be considered as part of the work of the Congress of Applied Chemistry."

11. "That a subsection dealing with the chemistry of petroleum should, in the future, be a subsection of the congress."

12. "That an international commission be appointed to establish uniformity in the control of the escape of noxious gases."

13. "That each succeeding Congress of Applied Chemistry do examine and report upon the progress and position of chemical industry in each of the countries party to the congress, having particular regard to the country in which the congress is for the time being held, and to the relation between the development of chemical industry and customs' tariffs."

Monsieur Lindet proposed that the International Commission on Analyses be continued with a grant of 2,000 frs. It was approved.

The Hon. Whitelaw Reid, the American Ambassador, at the request of the American delegates, presented the official invitation of the government to hold the eighth congress in 1912 in this country. After reading and submitting the instructions of the Secretary of State, the Hon. P. C. Knox, to the American commissioners, Mr. Reid made a most felicitous speech, insisting upon the acceptance of the invitation. There were reasons why the delegates to that congress should feel at home in the United States. One large section of that great country was called New England. There were many large sections of it which might properly be called New Ireland. (Laughter.) Certainly the people in those sections had shown great capacity for self-government and for governing the Americans. (Laughter.) There were also many sections which might properly be called New Germany, and a whole region in the northwest that might be called New Sweden and Norway. The historic claims of the Dutch in America were commemorated in New Amsterdam, and the Italians, who discovered the country, would find many of their countrymen still there to welcome them. (Cheers.) The delegates, if they accepted his invitation, would go next to a country which looked especially on the work of science as, above all, tending to promote happiness and diffuse peace among the nations of the earth. (Cheers.)

Dr. Wiley, of the Department of Agriculture, Washington, seconded the invitation, and said that

according to the last census over 10,000,000 of the citizens of the United States had been born in foreign lands. Thus, an eighth of the whole population of the United States were foreigners who had been received into citizenship. The delegates of every nationality could count upon being welcomed in their own tongue.

Professor Meldola, representing the Society of Chemical Industry, in supporting the invitation, said it was the first time in the history of the congress that the delegates had received a direct message from the ruler of a great nation asking them to meet in his country. (Cheers.)

The invitation was accepted with acclamation.

The president then proposed Professor E. W. Morley as honorary president and Dr. W. H. Nichols as acting president for the next congress.

Dr. Otto N. Witt seconded the nominations, saying that the success of the past congresses had been due largely to the circumspect choice of presidents, and the nominees presented guaranteed the success of the next.

Dr. Chas. Baskerville, in supporting the nominations, spoke of the appreciation of the teachers of chemistry of the choice, because Professor Morley had been the successful investigating teacher and all teachers of chemistry knew they had no better friend than that captain chemical technologist, Dr. Nichols.

The nominees were elected with acclaim.

Dr. Nichols made a modest speech of acceptance and assured the congress of a cordial reception on the part of all Americans.

Dr. Wiley proposed that the official delegates from the United States be nominated members of the organizing committee, with power to add to their number. This proposal was seconded by Professor Clarke and carried.

6. The president proposed that a permanent officer (Delégué des Presidents) be appointed by the International Commission of the Congresses of Applied Chemistry. This was passed after Dr. Nichols had suggested that the expense be borne by the succeeding congress in each case. It is intended that this official after publishing the proceedings of one congress take up his residence in that country where the next congress is to be held and there give the organizing committee that aid it may require.

Sir Henry Roscoe proposed, and Professor Carl Duisberg seconded, the following motion: "That all communications to the congress be submitted to an English publication committee, on the understanding that they be judged with perfect fairness and impartiality." It was carried.

The following delegates then addressed the meeting, expressing thanks:

Monsieur Lindet, as president of a former congress; Dr. Francisco P. Lavalle, Argentina; K.K. Regieurungsrat F. Strohmer, Austria; M. Francois Sachs, Belgium; Mr. Ou Kouanze, China; Senor Don Francisco Becerra, Colombia; Dr. Luis E. Mourgues, Chile; Mr. G. A. Hagemann, Denmark; Senor Don C. Nevares, Ecuador; Professor Armand Gautier, France; Geheimer Regierungsrat Professor von Buchka, Germany; Dr. P. D. Zacharias, Greece; M. Nikolaus Gerster, Hungary; Senatore Emanuele Paternò, Italy; Professor Mitsuru Kuhara, Japan; Dr. Hoogewerff, The Netherlands; Mr. Samuel Eyde, Norway; Dr. Hugo Mastbaum, Portugal; Dr. L. Edeleanu, Roumania; Professor N. Tavildaroff, Russia; Professor Marco T. Lecco, Servia; Professor E. Pinerua y Alvarez, Spain; Professor P. Klason, Sweden; Professor Dr. E. Bosshard, Switzerland; Dr. David P. Day, United States.

The president declared the congress closed, after a most successful meeting.

The American commissioners were Dr. H. W. Wiley, chairman, representing the government, with Drs. F. W. Clarke, David T. Day and Allerton S. Cushman; Dr. W. H. Nichols, representing chemical manufacturers and the American Chemical Society; Dr. Francis Wyatt, technical analytical chemist; Dr. Leo H. Baekeland, the American Electro-chemical Society; Mr. Maximilian Toch, chairman New York Section of the Society of Chemical Industry; Dr. Morris Loeb, president of the Chemists' Club; Mr. Albert Plant, the manufacturing druggists; and Professor W. L. Dudley, Vanderbilt University, and Professor Chas. Baskerville, College City of New York, representing the teachers of chemistry.

In addition to the American commissioners, all of whom were present, the following attended from the United States: Mr. E. A. Sperry, Mr. E. R. Taylor, Mr. Carleton Ellis, Dr. E. A. Byrnes, Dr. Walker Bowman, Dr. Jokichi Takamine, Dr. Hugo Schweitzer, Mr. Hugo Lieber, Mr. Henry Wigglesworth, Dr. Bernard C. Hesse, Dr. W. D. Horne, Dr. Arthur M. Comey, Dr. Chas. L. Reese, Dr. E. Gudeman, Dr. H. M. Smith, Dr. R. Kennedy Duncan, Dr. Arthur Elliott, Mr. Wm. J. Evans, Mr. Wm. S. Gray, Mr. I. F. Stone, Mr. David Wesson, Mr. T. J. Wrampelmeier, Dr. W. D. Harkins, Dr. H. B. Hite, and others whose names your reporter did not secure.

CHAS. BASKERVILLE